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THE Journal

OF THE AMERICAN DENTAL ASSOCIATION

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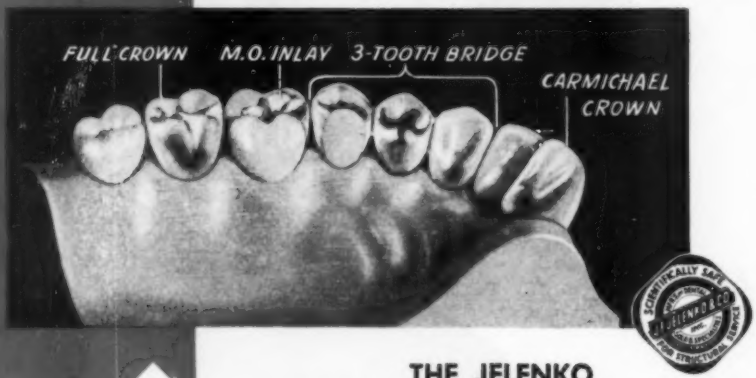

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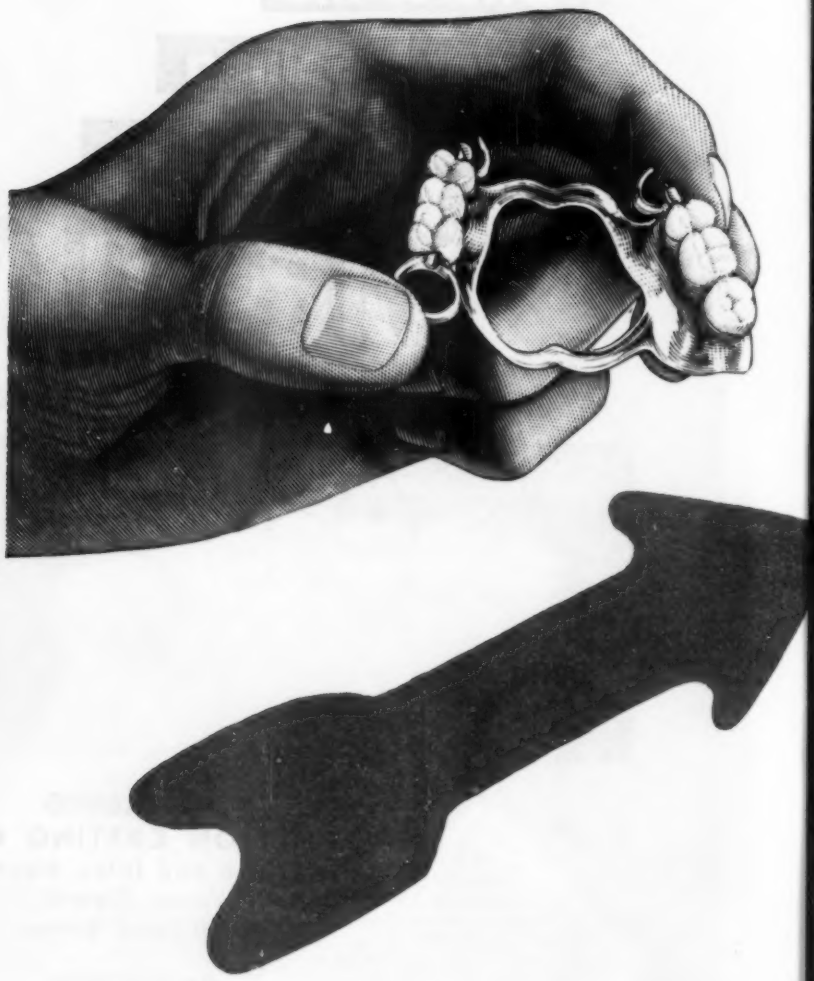

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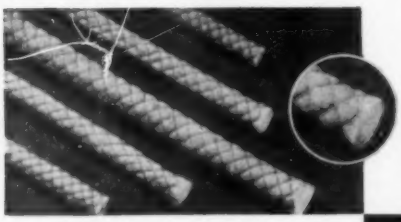

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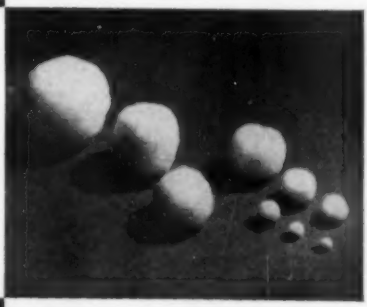

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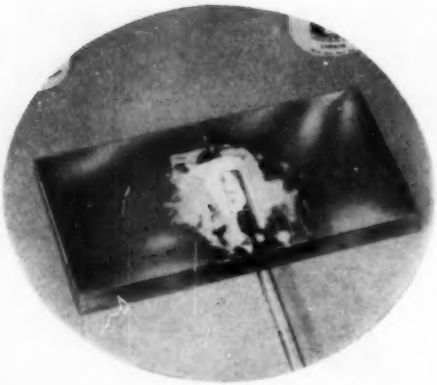

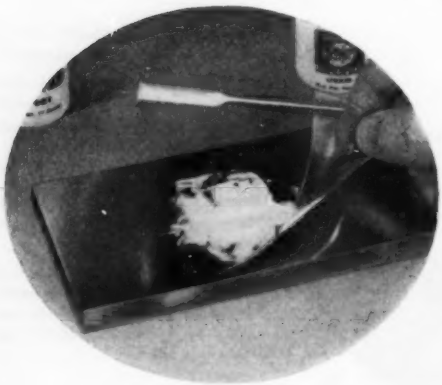

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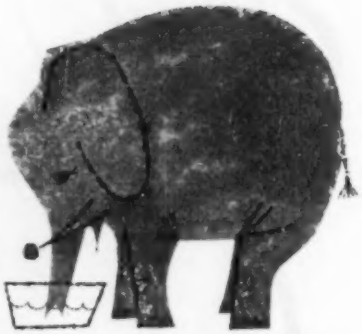

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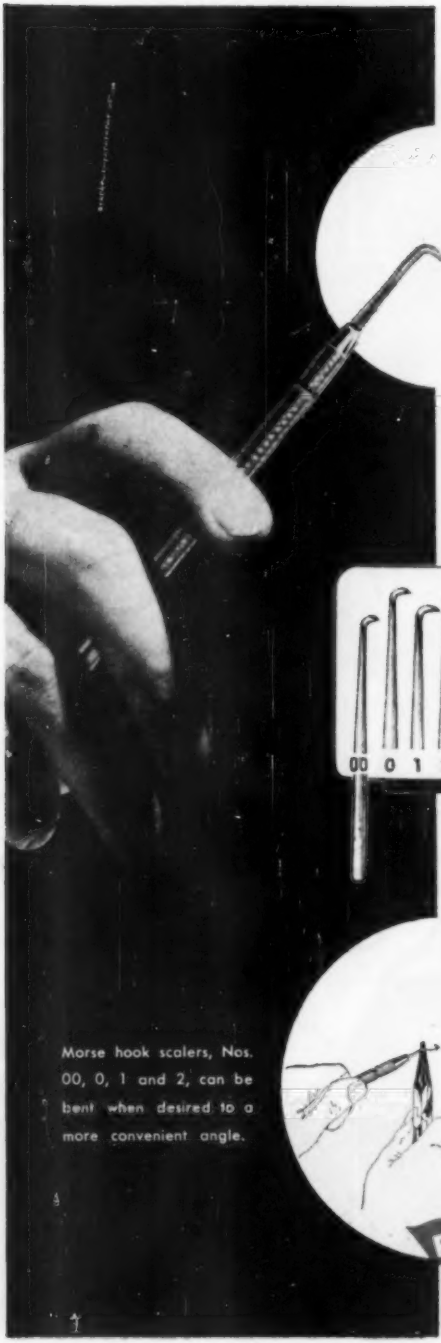

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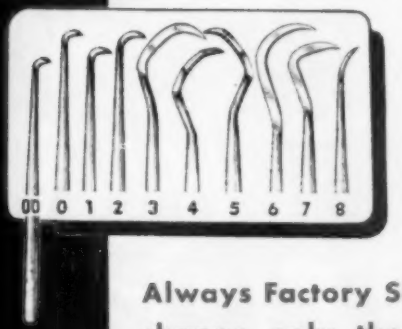

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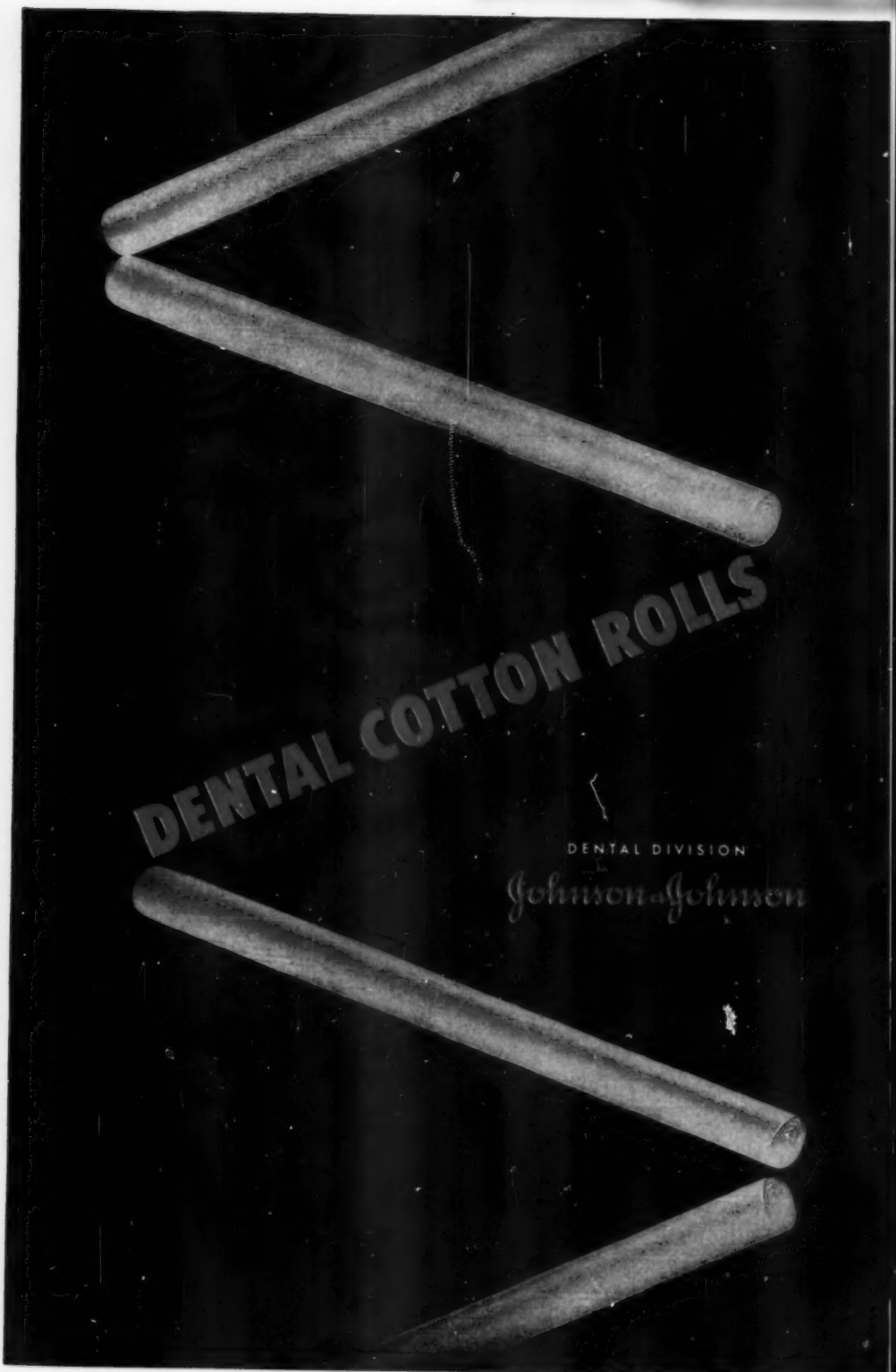
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Comparison of tissue response to rotary and ultrasonic dental cutting procedures

Louis S. Hansen, D.D.S., U.S. Navy, and Arne G. Nielsen,† D.D.S., Bethesda, Md.*

This paper is the third in a series of reports on the construction and application to dental use of a vibration cutting instrument operating at ultrasonic frequencies. The first report[1] described the development of an experimental dental instrument. The second paper[2] reported the results of six exploratory studies of the physical characteristics of the vibration cutting process. The object of this paper is to report the observations of a limited study concerned with the comparative biologic response to rotary and vibrational cutting. This experiment was conducted to contribute data toward a biologic evaluation of the vibration cutting process. Such an evaluation is necessary to determine the feasibility of clinical application of the process.

MATERIALS AND METHODS

Forty guinea pigs, male and female, from the Naval Research Institute were used

The opinions or assertions contained in this article are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Presented at a meeting of the International Association for Dental Research, Chicago, March 1955.

*Captain, Dental Corps, U.S.S. Haven (AH-12), FPO, San Francisco.

†Commander, Dental Corps, U.S. Navy Dental School, Bethesda, Md.

1. Nielsen, Arne G.; Richards, James R., and Wolcott, Robert B. Ultrasonic dental cutting instrument: I. J.A.D.A. 50:392 April 1955.

2. Nielsen, Arne G. Ultrasonic dental cutting instrument: II. J.A.D.A. 50:399 April 1955.

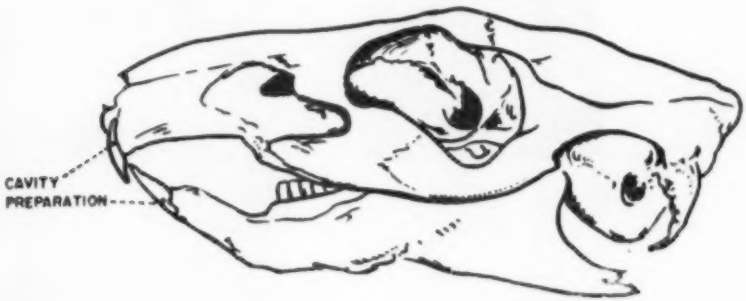


Fig. 1 • Location of cuts in test teeth

in the study. The ages of the animals ranged from 18 to 24 months, and their weights ranged from 800 to 1,000 Gm. The animals were fed a Rockland fortified diet.

One of the four continuously erupting incisors in each animal was cut with the ultrasonic vibration process; one other incisor was cut with a conventional rotary instrument and the remaining two were left uncut for controls. The vibration cutting was done with the previously mentioned experimental instrument used with an aluminum oxide abrasive slurry. The rotary cutting was accomplished with a diamond-coated wheel, 7 mm. in diameter and .016 inch thick, used at a speed of 12,000 rpm. A water spray coolant was used in conjunction with it. Light hand pressure, less than 6 ounces, was applied to both instruments during cutting procedures. All cuts, both vibratory and rotary, were made on the labial surfaces of the test teeth at a point 3 to 5 mm. below the gingival margin. The cuts were made at right angles to the long axis of the tooth (Fig. 1) and as deep as could be accomplished without exposing the pulp. Cutting procedures were performed while the animals were under thiopental sodium anesthesia administered intraperitoneally. The dosage was 50 mg. per kilogram body weight in a 10 per cent solution. The gingival tissue was incised, and the overlying bone was removed from the labial tooth surface exposing an area approximately 3 by 4 mm. for access to the cut site. The time necessary for the cuts, vibratory and rotary, was between five and ten seconds.

After a two week postoperative period, the jaws of the animals were removed while the animals were anesthetized with thiopental sodium. The jaws were separated in the midline, fixed in 10 per cent Formalin and decalcified with a chelating agent. The specimens were embedded in paraffin, and longitudinal sections 7 microns thick were made at different levels in the block. All sections were stained with hematoxylin and eosin.

RESULTS

Sections of the 160 teeth and their adjacent structures were examined histologically. Sections of 18 teeth proved unsuitable for evaluation because of technical difficulties; accordingly, they were discarded from the study. The remaining specimens were placed in five groups (0, +, ++, +++, ++++) on the basis of the histologic examination. Group 0 did not reveal any significant deviations from the normal. The group-

ing of "plus one" to "plus four" was suggested by the extent of the observed alterations.

Group 0 • Eighty-three specimens were placed in this group. Sixty-one were from teeth that had had no cuts made, and 22 were from teeth cut by conventional rotary methods. None of the teeth cut by the ultrasonic method could be placed in this group because they all revealed at least minimal alterations from normal (Fig. 2).

Location of Disturbances • Disturbances in amelogenesis and dentinogenesis were found in certain teeth throughout the study. The significant alterations usually occurred in a particular region of these teeth. The "area of disturbance," as measured on the mounted preparation by an ocular micrometer, was located approximately 3 to 4 mm. in an incisal direction from the formative end of the tooth. If continued eruption of the tooth is allowed for, this area would correspond to the most apical portion at the time the tooth was cut (two weeks prior to sacrifice). That portion of the tooth incisal to this area will be referred to as the preinstrumentation segment, and that portion apical to it, as the postinstrumentation segment (Fig. 3, left).

Group "Plus" One • Significant alterations were minimal and were limited to the ameloblastic layer of epithelium. In certain teeth the continuity of this layer was interrupted, and the connective tissue (labial alveolar periosteum) was in contact with the tooth (Fig. 3, left and right). In some instances the ameloblasts were reduced in height. The ameloblastic layer, in losing its uniform appearance, became quite irregular; it assumed a squamatoid character. Microcysts were sometimes present. In and about this disturbed enamel epithelium

MICROSCOPIC FINDINGS	ROTARY	ULTRASONIC	CONTROLS
0	22	0	61
+	12	10	12
++	0	6	0
+++	0	9	0
++ ++	0	10	0
TOTALS	34	35	73
UNSUITABLE FOR DIAGNOSIS	6	5	7
	40	40	80

Fig. 2 • Summary of microscopic observations

was an acellular, eosinophilic material. This material was interpreted as poorly formed enamel matrix (Fig. 3, right, and Fig. 4, above). No significant alterations were observed in the dentin, odontoblastic layer, pulp, cementum or periodontal membrane.

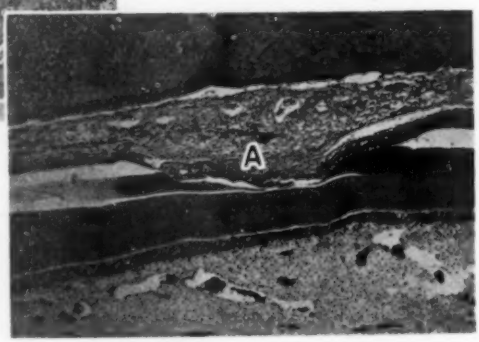
Thirty-four specimens were placed in this group. Twelve were found in the control group, 12 in the group cut by conventional methods, and ten in the group cut with the ultrasonic vibration process (Fig. 2).

Group "Plus" Two • In this group the changes in the ameloblastic layer were the same as in the "plus one" group but more extensive (Fig. 4, above). As in the "plus one" group, significant alterations other than in the ameloblastic layer were not noted. Their location in the ameloblastic layer was the same. In a few instances, small spurs of a cementoid substance arising from the dentin and projecting into the labial alveolar periosteum were seen.

Six sections, all of which were from the ultrasonic group, were classed in the "plus two" group (Fig. 2).

Group "Plus" Three • As in the former groups, the disturbance in amelogenesis was present and was located about the same distance from the formative region of the tooth. In addition to the ameloblastic alterations, extensive disturbances in the dentin, odontoblastic layer and pulp were present. These latter changes were found in the preinstrumentation segment, whereas in the postinstrumentation segment, normal tooth formation was present (Fig. 4, below). In the preinstrumentation segment, the pulp chamber revealed several deviations from normal. Interference of normal dentin formation was apparent. Various amounts of an irregular eosinophilic material containing cellular inclusions

Fig. 3 • Left: "Plus one" change in mandibular incisor prepared by ultrasonic method. Note "area of disturbance" in ameloblastic layer at A



Right: "Plus one" change in mandibular incisor cut by rotary process. Alterations (A) similar to those of ultrasonic method

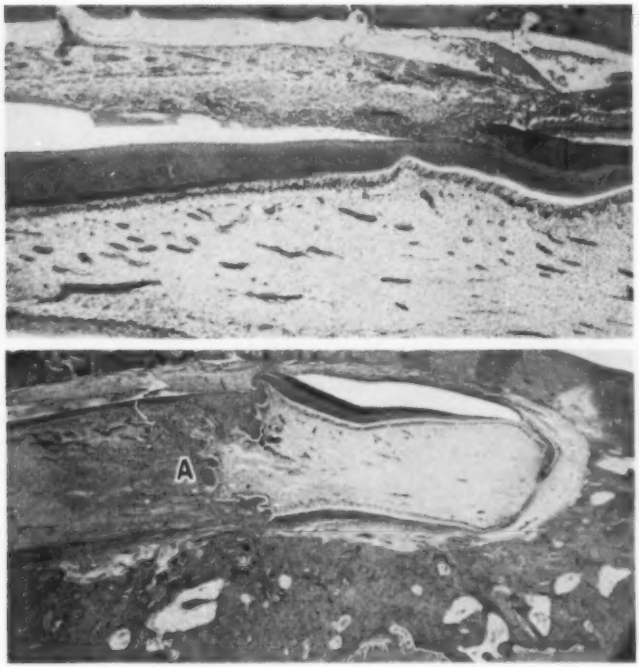


Fig. 4 • Above: "Plus two" changes in mandibular incisor cut by ultrasonic method. "Area of disturbance" more extensive than in "plus one." Below: "Plus three" alterations in mandibular incisor prepared by ultrasonic method. Note distinct separation into preinstrumentation and postinstrumentation segments. In addition to changes in ameloblastic layer, note large masses of osteodentin at A

were found in the pulp chamber in direct continuity with normal-appearing dentin. This material, somewhat resembling bone, is referred to as osteodentin. It was lined with plump, columnar cells having amphoteric-staining cytoplasm and relatively large, vesicular nuclei situated near the base of the cell.

The pulp tissue in the region of the osteodentin was composed of young, cellular, relatively vascular, fibrous connective tissue. In regions where this tissue was present, there was no normal odontoblastic layer. In an incisal direction from the regions with these disturbances, some teeth exhibited a loose, edematous pulp containing cells having small, round and deeply stained nuclei. In such regions, the cells of the odontoblastic layer also revealed pyknotic nuclei and a pale-staining cytoplasm.

Nine specimens were placed here, all of which were from the ultrasonic group (Fig. 2).

Group "Plus" Four • The defect in amelogenesis was again present, and, in addition, enamel formation had ceased altogether. Dentinogenesis was disturbed to the extent that dentin formation had

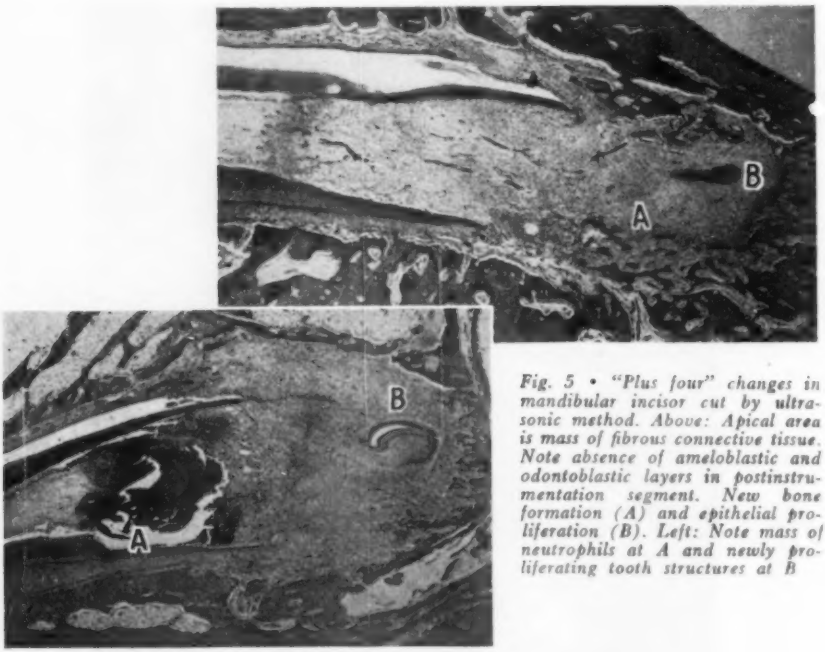


Fig. 5 • "Plus four" changes in mandibular incisor cut by ultrasonic method. Above: Apical area is mass of fibrous connective tissue. Note absence of ameloblastic and odontoblastic layers in postinstrumentation segment. New bone formation (A) and epithelial proliferation (B). Left: Note mass of neutrophils at A and newly proliferating tooth structures at B

also ceased. The usual preinstrumentation and postinstrumentation segments were not as well defined.

In the apical region of a normal tooth, the tooth-forming elements are present, but, in this group, none of these structures could be seen. The apical region was filled with young, cellular, relatively vascular, fibrous connective tissue (Fig. 5, above). Toward the incisal end, the pulp chamber revealed the degeneration noted in the "plus three" group.

A total of ten sections could be placed in this group, all of which were from teeth cut by the ultrasonic method. In two of the ten, an acute purulent pulpitis was present in the apical region (Fig. 5, left). In three instances, small isolated regions of newly developed tooth structures were apparent at the base of the alveolus (Fig. 5).

DISCUSSION

A comparison of the histologic alterations present in the rotary group with those in the control group revealed that the severity of the changes appeared about equal, although the alterations were proportionately more frequent in the group cut by rotary instruments.

In comparing the changes observed in the group of teeth prepared by the ultrasonic instrument with the changes in the rotary and control groups, it was considered significant that every tooth in the ultrasonic group exhibited alterations ranging from "plus one" to "plus four"; whereas, in the rotary and control groups, less than a fourth of the teeth revealed changes, and these changes were never more than minimal (Fig. 2). Only the teeth in which cuts were pre-

pared by the ultrasonic method showed disturbances in dentinogenesis. It would appear then that in operations on the incisor teeth of guinea pigs, some factor connected with the ultrasonic dental cutting instrument instituted changes of a more severe nature than those associated with the conventional rotary instrument. The histologic changes observed were nonspecific in nature. The factor or factors responsible for their occurrence were not determined.

This report is concerned only with what was seen at the end of a two week postoperative period. It is emphasized that this study applies only to the ultrasonic cutting instrument employed and to the animals used. Analogous results in human beings or other animals with the same or other ultrasonic instruments cannot be assumed. Nevertheless, the experiment was conducted on living tissues, and the comparative results of the two methods employed were considered valid and significant. The attempt to determine in continued studies why such differences exist appears justified.

SUMMARY

1. Minimal disturbances in amelogenesis were found in teeth in which cuts were made by the rotary and ultrasonic methods and also in teeth in which no cuts were prepared. The factors responsible for these disturbances were not determined.

2. More severe and more frequent disturbances in amelogenesis were found to be associated with the ultrasonic vibratory cutting process than with conventional methods.

3. Severe pulp changes and alterations in dentin formation, which were not present in teeth prepared by rotary methods, were found in teeth cut by the ultrasonic handpiece.

Unity of Science • We may liken any science to a chain of facts which are linked together in an invariable order. Now, it has happened over and over again that various portions of such logical chains had been completed, but that the links connecting them were still missing. These links were eventually discovered, often by the help of scientific considerations of a radically new order, that is, borrowed from another science, and it was then possible to complete the whole chain in a rigorous and unexceptionable manner. If such an event had happened but once, we might ascribe it to chance, but it has happened so often that the probability of these occurrences being due to hazard is infinitely small, and we can draw no conclusion but this: Science is one. *George Sarton, Introduction to the History of Science, vol. 1, p. 31.*

Variations in the efficiency of bitewing roentgenograms as related to age of patients

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The increase in the number of observations of dental caries as noted in bitewing roentgenograms has been recorded frequently in the past few years. These films are in widespread use by the dental profession; in a recent survey,[1] 40 per cent of the reporting dentists said that they took bitewing roentgenograms for their patients every six months and another 49 per cent said that they took them every year.

Public health dental programs have made relatively little use of the films. The reasons lie in part with the dental statistician, who has found bitewing roentgenograms to produce little change in the DMF tooth counts by which he commonly measures his results[2] and in part with the overworked school dentist who has already found more instances of caries by explorer examination than he can treat. Between the two, the preventive value (or the early control value) of the bitewing roentgenogram has been overlooked; so also has the educative value of the bitewing roentgenogram, for the pictorial evidence it provides a child is a powerful factor in promoting dental treatment.

The efficiency of any public dental program which concentrates treatment on accessible carious lesions to the neglect of proximal lesions is open to question. Roentgenograms have been found not only to produce considerable total increases in proximal caries observations[3] but also to uncover a large proportion of deep dentinal lesions entirely unnoticed by explorer examination of average thoroughness.[4] The positive value of bitewing roentgenograms in a public health program, therefore, seems to be great.

Barr and Gresham,[5] studying proximal caries in adolescents and young adults, noted that loss of teeth increases the efficiency of the explorer examination, hence renders the use of roentgenograms less necessary. The presence of restorative work reduces the efficiency of the roentgenogram, because radiopaque filling

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1. Bitewing films an important part of oral examination, say dentists. D. Survey 26:1707 Dec. 1950.

2. Chilton, N. W., and Greenwald, L. E. Studies in dental public health administration. II. Role of roentgenograms in public health dental surveys. J. D. Res. 26:129 April 1947.

3. Blayney, J. R., and Greco, J. F. Evanston dental caries study. IX. Value of roentgenological vs. clinical procedures for the recognition of early carious lesions on proximal surfaces of the teeth. J. D. Res. 31:341 June 1952.

4. Dunning, J. M., and Ferguson, G. W. Effect of bite-wing roentgenograms on Navy dental examination findings. U. S. Navy M. Bull. 46:83 Jan. 1946.

5. Barr, J. H., and Gresham, A. H. Detection of carious lesions on the proximal surfaces of teeth. J.A.D.A. 41:198 Aug. 1950.

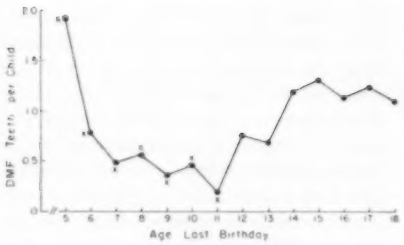

Fig. 1 • New DMF and def teeth per child found by bitewing roentgenogram among 729 New Jersey school children in 1945. X—includes def deciduous teeth

materials overshadow carious lesions. The investigators noted that efficiency also varies with the extent of caries penetration and with the region of the mouth.

Variations in the efficiency of the bitewing roentgenogram as related to the age of the patient seem never to have been studied as such, though the data of Chilton and Greenwald[2] and Blayney and Greco[3] show such variations. Figures 1 and 2 illustrate the trends seen in these studies. Both, it will be noted, show decreasing number of observations of caries in children from six to eight years of age and increasing observations in children from 12 to 14. Chilton and Greenwald give the age range from 5 to 18 (Fig. 1). Their smallest number of observations of new caries by bitewing roentgenogram are at age 11. This would agree with the clinical impression of most dentists, for the period when deciduous molars are being shed is one when posterior proximal tooth surfaces are most accessible, hence roentgenograms are least necessary.

The increasing efficiency of the bitewing roentgenogram during the teen-age period can perhaps be explained on the basis of the large number of new permanent teeth in the mouth, all with susceptible and inaccessible proximal surfaces. As the years pass, lesions accumulate, but not for several years do these lesions become large enough to undermine marginal ridges and break through to the occlusal surfaces. The Bureau of Economic Research and Statistics of the American Dental Association[6] reports a sharp peak in the need for fillings between ages 15 and 19. The average boy in this age group needs 5.62 teeth filled, the average girl, 4.86—much more than at any other time of life.

The public health dentist, concerned to make his budget dollar go as far as possible, will wish to know at what age the bitewing roentgenogram reaches its greatest efficiency and when, if at all, loss of teeth, the presence of restorative work and decreasing incidence of caries operate to reduce its efficiency. The present study was undertaken to help answer these questions.

METHOD

Over a period of four years, teams of eight to ten volunteers from the fourth year class of the Harvard School of Dental Medicine made surveys in the city of Newton, Mass., under the supervision of the authors and other members of the clinical teaching staff of the School.

6. American Dental Association, Bureau of Economic Research and Statistics. Survey of needs for dental care. II. Dental needs according to age and sex of patients. J.A.D.A. 46:200 Feb. 1953.

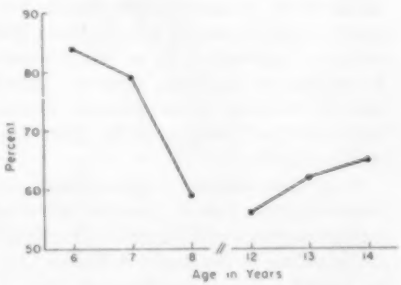

Fig. 2 • Percentage of proximal caries in permanent teeth found by roentgenogram alone in 12,014 children in Evanston, Ill., 1946-1950

Junior high and high school children were selected, and the group finally was extended to include students at Lasell Junior College and a few young Newton teachers in order to fill in gaps between ages 17 and 21. Similar data were already present concerning a group of Naval Reserve midshipmen in New York, aged approximately 21.[4] All samples were composed of entire classes or military sections, except in 1953 when it was necessary to rely on volunteers. Some 1,257 young people are reported in all.

Since examining teams and economic and geographic factors varied from year to year, it has been thought best to report basic data for each age series within each year, though samples of one age are pooled for purposes of analysis. This pooling seems justified since duplicate samples occurred only within the Newton school system. Most of the duplications involved the two junior high schools, from which group, pupils were combined in later years in the main high school.

Clinical examination was performed by mirror and explorer in a good light. Approximately five to ten minutes were taken for each examination, both at Newton and in the military study. The large number of examiners is to be regretted from a statistical point of view, though supervision of all by one of the authors (J.M.D.) suggests some uniformity in method. Conditions, actually, are not unlike those in many public health programs, where a variety of examiners and groups of patients is to be encountered. Recording of data was done by dental hygiene students from Forsyth Dental Infirmary for Children or by Navy hospital corpsmen.

As a complement to the clinical examination, one pair of posterior bitewing roentgenograms was taken on all patients participating in the study. A Philips Oralix dental x-ray apparatus was used in Newton. It has a focal spot of 0.8 mm., a fixed operating potential of 45 kv. and a tube current of 5 ma. An ultraspeed single intraoral Kodak film inserted in a Rinn bitewing loop was used. Exposure time varied between two and four seconds, depending on age, size and skeletal development of the patient; angulation was +5 degrees, the maxillary plane being horizontal. Films were developed at 70° F. for four minutes. All films were read by one examiner (H.D.W.) with a viewing box and a magnifying glass. Enamel defects were not counted as lesions.

The Navy films were of similar size and number, and were read by the two authors of that study. Details of exposure and development are not recorded. Interpretation was similar, though magnification was not uniformly used.

In all survey samples, occasional films were found on development to be imperfect, because of failure in electric current, tube shadow or other factors. This situation occurs also under service conditions. It was decided not to discard the films, but to read them for what information they contained, as might often be necessary under practical circumstances if (as in this study) the patient could not be called back for retake.

It is important to bear in mind that standard-sized intraoral films were used throughout the study, since some of the smaller children could tolerate nothing larger. If the longer no. 3 film had been used, the number of caries observations would almost undoubtedly have been greater. More carious teeth and surfaces would also have been observed if two pairs of standard films had been used, one angulated for bicuspids, one for molars.

Data from the explorer examinations were tabulated and summarized first. Roentgenographic observations, made and recorded on film envelopes without reference to the explorer work, were next transferred in colored pencil to the original chart. Data on all patients of one age within a given year's survey were then collected, and frequency distribu-

tions were prepared, first of explorer observations (D, M, F and DMF teeth) and then of observations by roentgenogram (new D, M, F and DMF teeth and new carious surfaces).

Statistical analysis included the calculation of standard errors for roentgenographic changes. These form the basis for subsequent statements as to significance of differences between certain mean values. No sample of less than ten patients has been tabulated or analyzed.

DATA

Table 1 records the results of the various surveys. Reference to the column for DMF teeth shows that the five survey groups, although not identical in caries experience, had a high incidence of caries and were not incompatible with each other. Pooled samples for purposes of analysis appear at the bottom of the table. The high incidence of caries should be borne in mind if any attempt is made

Table 1 • Dental conditions per person among Newton, Mass., school and college students, 1950–1953, and U.S. Naval Reserve midshipmen, 1944. Permanent teeth only, third molars excluded

Group surveyed		Teeth							Surfaces decayed
Age last birthday	No. subjects	Decayed		Missing	Filled		DMF		
		Explorer*	X-ray †	‡	Explorer*	X-ray †	Explorer*	X-ray †	X-ray†
Weeks Jr. High School, 1950									
13	75	4.03	2.29	0.29	4.21	−1.01	8.53	1.28	3.45
14	156	4.05	3.34	0.39	4.97	−1.68	9.41	1.63	5.23
15	31	6.16	3.32	0.65	6.16	−2.29	12.97	1.07	5.23
Day Jr. High School, 1951									
12	36	5.47	2.20	0.42	2.33	−0.72	8.22	1.48	3.58
13	118	7.13	1.95	0.44	3.17	−0.75	10.74	1.18	3.43
14	118	7.75	2.26	0.63	2.84	−0.76	11.21	1.50	4.58
15	35	9.31	2.18	0.49	2.51	−0.71	12.30	1.47	3.80
Newton High School, 1952									
15	41	5.68	2.66	0.44	5.10	−1.37	11.22	1.29	4.86
16	221	6.43	3.33	0.69	5.98	−1.90	13.10	1.43	5.83
17	64	7.64	3.27	1.62	5.27	−1.67	14.53	1.59	6.34
Newton High School and Lasell Jr. College, 1953									
17	18	6.22	5.28	0.61	6.67	−3.00	13.50	2.28	9.39
18	136	6.11	3.04	1.34	7.45	−1.86	14.90	1.15	5.35
19	70	3.36	3.50	1.23	10.44	−2.62	15.03	0.88	4.85
20	10	2.30	3.80	1.40	12.10	−3.20	15.80	0.60	5.20
22§	15	5.60	3.13	1.67	9.73	−2.33	17.00	0.80	4.53
23	14	3.57	3.50	1.21	9.71	−2.43	14.49	1.07	4.57
U.S.N.R. Midshipmen's School, New York, 1944									
21‖	102	2.65	2.43	0.66	8.98	−1.56	12.28	0.87	4.28
Pooled samples									
13	193	5.92	2.10	0.38	3.58	−0.85	9.88	1.23	3.44
14	274	5.64	2.86	0.49	4.05	−1.29	10.18	1.55	4.84
15	106	7.08	2.70	0.52	4.60	−1.42	12.21	1.26	4.62
17	82	7.33	3.71	1.40	5.57	−1.96	14.33	1.73	7.01

*Includes teeth or surfaces found by both explorer and roentgenogram.
†Found by roentgenogram alone.
‡Roentgenogram produced no changes in mean values greater than 0.03 teeth.
§A sample of six patients aged 21 is not tabulated.
‖Over a half were aged 21; almost all the rest were within one year of that age.

Table 2 • Frequency of changes in decayed tooth and surface counts following use of bitewing roentgenograms; 82 Newton children aged 17

Teeth					Surfaces	
Change	D	M	F	DMF	Change	D
−10			1		0	6
− 9			1		1	6
− 8			1		2	7
− 7			1		3	5
− 5			6		4	9
− 4			7		5	3
− 3			7		6	6
− 2			15		7	7
− 1	1*		19		8	6
0	13	82	23	27	9	2
+ 1	9		1*	16	10	1
2	9			19	11	9
3	15			4	12	4
4	13			10	14	1
5	1			3	15	5
6	6			2	16	3
7	4				21	1
8	3				23	1
9	2			1		
10	3					
11	2					
13	1					
Mean	3.71	0.00	−1.96	1.73		7.01
Standard error	.34	.00	.24	.20		.57

*A doubtful lesion was eliminated.

to extend the observations to apply in other parts of the country where caries experience is less. It will be noticed that the count of filled teeth observed by roentgenographic examination is a negative value; observations by roentgenogram of new carious lesions necessitated shifting some teeth previously considered only as filled to the column for decayed teeth to avoid double listing.

Table 2 shows a typical frequency distribution for roentgenographic changes. The number of carious (D) teeth observed increased, and the number of missing (M) teeth remained unchanged. The number of filled (F) teeth observed decreased, since, as previously mentioned, a number of teeth previously recorded as filled had to be shifted to the "D" column. DMF teeth increased slightly. In samples other than the one shown in Table 2, an occasional impacted or unerupted tooth was found in a space for which the tooth had been recorded as missing. Such teeth were removed from the DMF count. In no sample, however, did such changes result in a change of more than 0.03 tooth in the mean for missing teeth, hence no tabulation was made of them.

Figure 3 shows in graphic form the changes in various components of the DMF count as a result of the use of the bitewing roentgenogram. Increases in DMF teeth were relatively small, as was noted by Chilton and Greenwald; the increases averaged a little above one tooth per person. There was a slight peak for the increases at age 17, though of doubtful statistical significance. The value for the pooled sample at that age differed by an insignificant amount from values for younger ages, though by a significant amount from the values for ages 18 and over. All increases were so small that if DMF counts were the only values to result from caries surveys, one might agree with Chilton and Greenwald that roentgenograms are of little practical importance. Surveys to measure caries susceptibility (as distinct from treatment needs) are usually centered in DMF counts.

The data in terms of carious (D) teeth showed a greater change produced by the use of the bitewing roentgenogram. From two to five more carious teeth per person were found by roentgenogram, with a tendency toward larger increases in the older ages. Any survey attempting to measure the need for dental treatment will be seriously concerned with increases of this size.

All changes in filled-tooth counts were reductions. It seems apparent that more filled teeth were shifted into the "D" column in the older age groups, as a result of roentgenographic examination. The changes are so dependent on the amount of previously rendered restorative treatment, however, that there is little inducement to draw conclusions from them.

New carious surfaces provide a far more accurate measure of the need for dental treatment than do new carious teeth, and a much more realistic one as far as the dental practitioner is concerned. Figure 4 shows that the changes resulting from only two dental films per person were large. In no sample did roentgenographic examination show less than three new carious surfaces per person; in seven samples it showed five or more new carious surfaces, and the maximum shown was above nine. The mean for the entire group was 4.91. For the first time a well defined variation in the efficiency of the bitewing roentgenogram in regard to the age of the patient was noted. A fairly sharp climb in efficiency of the bitewing roentgenogram was seen up to age 17, then a gradual drop.

Table 3 attempts an analysis of the statistical significance of the peak seen at age 17. Critical ratios are computed for all differences between age 17 and other ages. Only twice, it will be seen, does the ratio fall below two, the so-called "5 per cent level of probability." Once the decrease was with age 16, the age next to the maximum. The other time, it was with a sample of only ten patients, a sample too small to justify serious consideration. Critical ratios of three, it will be remembered, indicate a probability of a third of 1 per cent for accidental occurrence; ratios of four and over, a probability of less than one in one million.

Barr and Gresham's statements on the reduced efficiency of roentgenograms in the presence of restorations prompt the question how much difference previous access to the private dentist makes among teenagers. The 136 18 year old students in the 1953 Newton survey were divided between the high school, where they were for the most part a retarded and low income group, and Lasell Junior College, where incomes were much higher and the completion of dental treatment had been requested at the time of admission. In Table 4 it can be noted how nearly identical were the two DMF tooth counts and how different were the num-

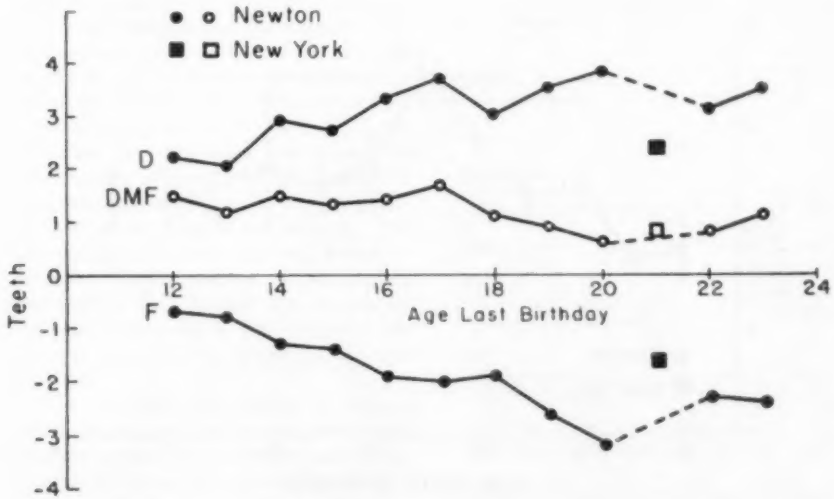

Fig. 3 • Changes in count of D, F and DMF teeth per person, produced by bitewing roentgenogram in Newton, Mass., and New York

ber of filled teeth (5.61 per person in the high school, 10.73 in the junior college). The bitewing roentgenograms produced a somewhat greater rise in carious (D) teeth among the junior college students than in the high school; the changes in terms of new carious surfaces were almost identical. On the whole, it may be said that the roentgenograms were of similar (and great) value to both groups. The difference in previously filled teeth affected the value very little.

In public health dental programs, circumstances may arise in which roentgenograms can be made easily and explorer examinations cannot. It is therefore of interest to know how much of the total carious surfaces for the entire mouth can be found by bitewing roentgenogram alone. Table 5 has been constructed to show the total caries observations made by explorer and by roentgenogram. The data for each of these methods include those carious surfaces found both by explorer and roentgenogram. Data for certain patients, notably those in the Weeks School survey, could not be used, as the envelopes on which original roentgenographic observations had been noted were no longer available.

Figure 5 shows the percentage of carious surfaces found by roentgenogram at different ages. A steady increase in the efficiency of the bitewing method is seen up to age 21, when almost three quarters of the total caries observations (72 per cent) can be picked up by one pair of posterior bitewing roentgenograms alone. As only 40 per cent of the total observations for this age group resulted from explorer examination, it is seen that the bitewing roentgenogram actually was the better of the two methods here, by a wide margin. In the oldest age group at Newton in which a large sample is available, age 19, 67 per cent of the total observations are to be credited to the bitewing roentgenogram. Only 47 per cent of the total carious surfaces were found by explorer. If the two ages with the highest percentage (age 20 and 21) are taken to-

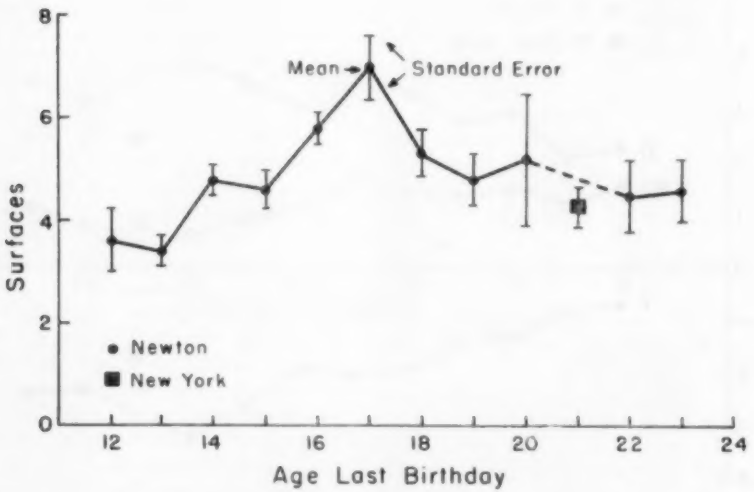

Fig. 4 • New carious surfaces per person found by bitewing roentgenogram alone in Newton, Mass., and New York

Table 3 • Differences in new carious surfaces per person found by bitewing roentgenogram alone at age 17 and at other ages

Age	Mean new surfaces	S.E.* of mean	Diff. fr. age 17	Critical ratio
12	3.58	.64	3.43	3.99
13	3.44	.28	3.57	5.60
14	4.84	.29	2.17	3.39
15	4.62	.37	2.39	3.53
16	5.83	.30	1.18	1.82
17	7.01	.57	—	—
18	5.32	.36	1.66	2.53
19	4.85	.47	2.16	2.91
20	5.20	1.29†	1.81	1.28
21	4.28	.37	2.73	4.00
22	4.53	.72	2.48	2.70
23	4.57	.59	2.44	2.98

*Standard error.
†Reflects a sample of only ten subjects.

gether, 72 per cent of the total observations are by roentgenogram and only 39 per cent by explorer. Note that these paired percentages add to more than 100 per cent because certain carious surfaces were found by both roentgenogram and explorer.

The values for ages 22 and 23 in Table 5 show a drop in efficiency for the bitewing roentgenogram. Both values are for very small samples and the value for age 22 is seriously out of line. Further study would be needed before any conclusions could be reached about this age period.

A valid criticism of the values in Table 5 is that they represent the average of observations in a fairly large number of instances and help little to predict observations in an individual instance. The percentage of carious surfaces found by bitewing roentgenogram varies among the persons in a typical age sample all the way from zero to 100, although the greatest frequency of values is at or near the mean.

The reliability with which a person's total caries score can be predicted from the observation of his bitewing roentgenogram is perhaps best expressed by a correlation coefficient obtained by matching a number of pairs of these values. This has been done for a group of 311 children ages 12 to 15 at the Day School in 1951. The resulting coefficient is + .85. In simple terms, this means that if a person has a high number of carious surfaces found by bitewing roentgenogram, there is a very great chance that he will also have a proportionately high total caries score; if he has an average number of carious surfaces found by bitewing roentgenogram, it is probable he will have an average total score; if roentgenographic examination reveals that he has a low caries score, there is a very great chance he will also have a proportionately low total score. A correlation coefficient of 1.00, it will be remembered, would represent complete predictability of one score from the other.

DISCUSSION

The foregoing study suggests a reappraisal of one belief concerning bitewing roentgenograms; namely, that they are

Table 4 • Dental conditions (1953) among Newton High School and Lasell Junior College students, all age 18 at last birthday

	High school	Junior college
Number of patients	87	49
Affected teeth		
Carious (DI):		
By explorer	7.50	3.65
By roentgenogram alone	+ 2.59	+ 3.88
Missing	1.83	0.90
Filled:		
By explorer	5.61	10.73
By roentgenogram alone	− 1.40	− 2.63
DMF:		
By explorer	14.95	15.31
By roentgenogram alone	+ 1.10	+ 1.16
New carious surfaces		
By roentgenogram alone	[illegible]	5.33
Filled-tooth ratio:*		
Before roentgenogram	[illegible]	70%
After roentgenogram	[illegible]	49%

*Filled teeth divided by DMF teeth.

necessary for research purposes but not for surveys to determine the dental needs of school children and other groups. Many research evaluations are based on explorer counts of DMF teeth. Such counts, admittedly less revealing than full counts of DMF surfaces, are valuable because they can be applied to broader, hence more representative, samples for a given expenditure of man-hours. They are valuable also because smaller variations in interpretation make them easier to reproduce at other times and places. Explorer counts of DMF teeth are thus a standardized view of the caries picture, even if not necessarily a complete one. This study adds to previous evidence that bitewing roentgenograms alter such counts of DMF teeth to a relatively small extent.

Surveys to determine dental needs of groups, however, have more reason to be complete. Caries control and prevention cannot be accomplished merely by filling large cavities. A public health dental program fails in a vital objective if it sends only those children with large lesions to the private dentist for treatment. The number of children in need of treatment is the ultimate measure for a survey of dental needs, and any method which leaves certain persons unaware of the existence of any needs is seriously defective. Detailed needs are better understood if they are expressed in terms of carious surfaces, that is, cavities, than in terms of teeth.

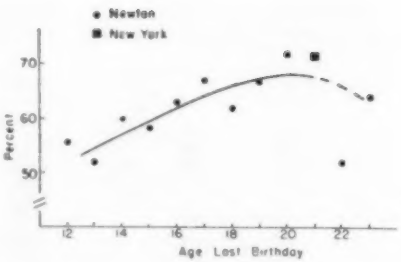

Fig. 5 • Percentage of carious surfaces for the entire mouth found by posterior bitewing roentgenogram in Newton, Mass., and New York

Bitewing roentgenograms increase substantially the number of children found to need dental treatment in any group. The bitewing roentgenogram has an added advantage in connection with a case-finding survey in that the pictorial evidence it furnishes is most helpful in sending the prospective patient to the dentist and equally helpful to the dentist at the time of treatment. The health officer, of course, should not affix a diagnosis to the films, else the freedom of the dentist to plan treatment is impaired. Private dentists who realize they are getting patients who would not otherwise seek care, do not resent the performance by a public health agency of the small task of bitewing roentgenography. One large insurance company clinic which has been taking roentgenograms for over 25 years[7] reports consistent approval of this method by the dentists of New York City.

Table 5 • Percentage of carious surfaces for the entire mouth found by explorer and by posterior bitewing roentgenogram

Age	Subjects	Explorer		Roentgenogram		Both methods	
		No.	%	No.	%	No.	%
12	36	262	*67	220	*56	391	*100
13	118	1,195	75	832	52	1,600	100
14	117	1,253	70	1,079	60	1,793	100
15	75	773	70	649	59	1,107	100
16	220	1,841	59	1,965	63	3,123	100
17	82	890	61	979	67	1,456	100
18	129	1,159	64	1,121	62	1,813	100
19	70	304	47	432	67	643	100
20	10	23	31	54	72	75	100
21	102	293	40	525	72	730	100
22	15	109	62	91	51	177	100
23	14	54	46	76	64	118	100
All ages	988	8,156	63	8,023	62	13,026	100

*The separate percentages for explorer and roentgenogram on any line add to more than 100, since a number of carious surfaces were found by both explorer and roentgenogram.

7. Dunning, J. M. X-ray and dental prophylaxis service in industry. J.A.D.A. 29:692 April 1942.

The employees of this company have been found to receive at their own expense almost twice as much operative treatment as the national average.

A final inducement to the use of bitewing roentgenography in certain public health dental programs lies in the variation of efficiency shown in this study. The modern trend of thought in school health examination work is that "one thorough, meaningful examination is much to be preferred over several hasty yearly check-ups."[8] The peak of efficiency for bitewing roentgenograms for the 17 year old patient suggests that one of these thorough examinations be for eleventh grade high school children, a much neglected group. Dental needs are then at their highest, but public health dental programs seldom reach high school children. One year remains before graduation; during that year, follow-up can be made to insure that a maximum of dental treatment is received. The low efficiency of the bitewing roentgenogram for the 11 year old child, on the other hand, suggests that the public health official not waste his money on bitewing roentgenograms for children of this age, if he has other ages to care for as well.

This study suggests but does not demonstrate a peak of efficiency for bitewing roentgenograms in detecting posterior proximal caries in deciduous teeth. Further work among children from four to eight years old might produce valuable results.

Analysis of the survey observations to show what proportion of the total new carious lesions was found by explorer and what proportion by roentgenogram leads to a reconsideration of one of the basic principles of dental diagnosis; namely, that the explorer is the indispensable tool. If one pair of bitewing roentgenograms for certain ages will reveal a much larger proportion of the total number of carious lesions than a reasonably careful explorer examination, then it becomes possible to think of screening surveys for caries carried out by bitewing roentgenogram alone, where time and funds are limited, much as in the screening of patients for pulmonary tuberculosis by photofluorography. The idea is stated with caution, however, for the dentist who uses an explorer has a chance to see the whole patient before him. Caries is not the only dental disease to which man is heir. If the dentist is to take time to see the patient at all, it is questionable how much time is saved by omitting a brief explorer examination.

SUMMARY AND CONCLUSIONS

A series of observations among young people from the age of 12 to 23, most of them in the high school system in Newton, Mass., the rest in the U. S. Naval Reserve in New York and in Lasell Junior College, Newton, has been used to study the influence of posterior bitewing roentgenograms on caries experience observations at different ages.

The count of DMF teeth rose slightly at all ages as a result of the use of the roentgenographic examination, but the increases were somewhat larger at age 17 than before or after. Counts of decayed teeth rose more sharply. Counts of filled teeth dropped, as new caries observations necessitated shifting some filled teeth to the column for decayed teeth to avoid double listing. Counts of missing teeth remained unchanged.

A sharp rise in the count of new carious surfaces resulted from the use of the bitewing roentgenogram. These increases were significantly greater at age 17 than before or after. This peak in the efficiency of the bitewing roentgenogram coincides with the sharp peak in the need for fillings between ages 15 and 19 recently demonstrated by the American

8. American Public Health Association. Committee on health service programs for secondary schools. Suggested standards for health services in secondary schools. (School Health Section.) Am. J. Pub. Health. 42:part 2 (Year Book) 139 May 1952.

Dental Association. Other studies have showed a low point in the efficiency of the bitewing roentgenogram at the period of the mixed dentition, around age 11.

The average increase in new carious surfaces produced by the use of one pair of posterior bitewing roentgenograms was 4.91 for the entire survey group and 7.01 for the 82 patients aged 17. These data demonstrate the importance of bitewing roentgenograms in surveys to determine the dental needs of young people. Without this aid, many persons with early proximal lesions of caries will feel they have no dental needs at all and will not seek treatment. The idea that bitewing roentgenograms are needed only for research purposes must be revised.

The peak of efficiency seen at age 17 suggests the great public health value of bitewing surveys of eleventh grade high school children.

Sixty-two per cent of all the new carious surfaces found in the entire survey would have been found even if explorer examinations had been omitted. This percentage varied in relation to the age of the patient and reached a peak at ages 20 and 21, at which ages 72 per cent of all lesions that were observed appeared in the bitewing roentgenogram. Only 39 per cent of the total observations for these ages were made by explorer. This situation suggests certain conditions under which public health dental examiners might screen for dental caries by bitewing roentgenogram alone, provided they do not omit examination of the patient for conditions other than caries.

Comparative fermentability of sorbitol, glucose and glycerol by common oral microorganisms

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It was the purpose of this study to compare the fermentability of sorbitol,[1,2] glucose and glycerol by common oral microorganisms. The bacteria tested were lactobacilli, streptococci, staphylococci and yeast.

Organisms freshly isolated from carious dentin or from the saliva of caries-susceptible patients were grown in a basic medium to which Berkefeld-filtered glycerol, sorbitol, or glucose was added aseptically, in amounts to make up 1 per cent of the medium.

The basic medium found to be most suitable contained the following: 0.3 per cent yeast extract (Difco), 0.5 per cent peptone (Difco) and 2.0 per cent Trypticase extract. The medium was adjusted

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1. Grubb, T. C. Studies on the fermentation of sorbitol by oral microorganisms. J. D. Res. 24:31 Feb. 1945.

2. Wick, A. N.; Almen, M. C., and Joseph, L. Metabolism of sorbitol. J. Am. Pharm. A. (Scient. Ed.) 40:542 Nov. 1951.

to pH 7.4 with twentieth-normal solution of sodium hydroxide.

To this medium was added sorbitol, Sorbo (70% Sorbitol Solution),[3] glucose, or glycerol as required. The substances to be tested were added to vigorously growing cultures. This addition was achieved in the following manner: Agar slants were inoculated with actively growing broth cultures. After a 24-hour incubation period at 37½° C., 0.1 cc. of heavy suspensions of bacteria were added to a series of tubes containing 5.0 cc. of broth. These were further incubated for 24 hours before test substances were added. They were then returned to the incubator, and individual tubes were removed for pH determinations at 3, 6, 12, 24 and 30 hours. In some instances, they were allowed to incubate for one week. Sugar-free broth cultures were main-

3. 70% Sorbitol Solution—Sorbo Brand, Atlas Powder Co., Wilmington, Del.

Table 1 • Mean pH of broth control and sugar broths of lactobacilli cultures—original medium sugar-free

Time	Glucose	Sorbitol	Sorbo	Glycerol	Control	No. strains tested
Bef. inoc.	7.4	7.4	7.4	7.4	7.4	65
3 hr.	7.2	7.36	7.37	7.36	7.38	20
6 hr.	6.91	7.32	7.32	7.36	7.4	65
12 hr.	5.93	7.22	7.22	7.38	7.42	65
24 hr.	4.91	6.65	6.78	7.28	7.43	65
30 hr.	4.76	6.25	6.39	7.26	7.44	45
1 wk.	4.16	5.10	5.14	6.56	7.29	42

Table 2 • Mean variation in pH of broth of lactobacilli cultures—orginally sugar-free media

Sugar	No. strains	7.4-7.1	7.0-6.5	6.4-6.1	6.0-5.6	5.5-5.1	5.0-4.6	4.5-4.0	3.9-3.8
		3 hours							
Glucose	20	17	3						
Sorbitol	20	20	0						
Glycerol	20	20	0						
Control	20	20	0						
		6 hours							
Glucose	65	37	14	10	4				
Sorbitol	65	62	3	0	0				
Glycerol	65	65	0	0	0				
Control	65	65	0	0	0				
		12 hours							
Glucose	65	4	14	12	15	10	10		
Sorbitol	65	54	11	0	0	0	0		
Glycerol	65	65	0	0	0	0	0		
Control	65	65	0	0	0	0	0		
		24 hours							
Glucose	65	3	0	2	1	9	32	18	
Sorbitol	65	18	23	10	11	3	0	0	
Glycerol	65	55	7	3	0	0	0	0	
Control	65	65	0	0	0	0	0	0	
		30 hours							
Glucose	45	0	0	0	4	2	16	22	
Sorbitol	45	9	8	7	13	8	0	0	
Glycerol	45	39	5	1	0	0	0	0	
Control	45	45	0	0	0	0	0	0	
		1 week							
Glucose	42	0	0	0	0	0	4	33	5
Sorbitol	42	6	0	0	2	22	12	0	0
Glycerol	42	2	5	20	3	2	1	0	0
Control	42	37	2 (6.9) 3 (7.0)	0	0	0	0	0	0

Table A • Lactobacilli. Statistical evaluation of differences between glucose and sorbitol cultures after 12, 30 and 168-hour incubation periods*

Hours	Glucose mean pH	Sorbitol mean pH	t	P
12	5.93	7.22	13.81	.001
30	4.76	6.25	11.98	.001
168	4.16	5.10	7.56	.001

*Large sample test on the difference of means was used.

Table B • Lactobacilli. Statistical evaluation of differences between sorbitol and sugar-free control after 12, 30 and 168-hour incubation periods*

Hours	Sorbitol mean pH	Sugar-free control mean pH	t	P
12	7.22	7.42	8.58	.001
30	6.25	7.44	11.72	.001
168	5.10	7.29	17.92	.001

*Large sample test on the difference of means was used.

Table C • Streptococci. Statistical evaluation of differences between sorbitol and glucose after 24-hour incubation periods*

Hours	Glucose mean pH	Sorbitol mean pH	t	P
24	4.93	6.96	12.86	.001

*Large sample test on a mean of paired differences was used.

Table D • Streptococci. Statistical evaluation of differences between sorbitol and sugar-free control after 24-hour incubation periods*

Hours	Sorbitol mean pH	Sugar-free control mean pH	t	P
24	6.96	7.64	4.58	.001

*Large sample test on a mean of paired differences was used.

Table E • Staphylococci. Statistical evaluation of differences between glucose and sorbitol after 24-hour incubation periods*

Hours	Glucose mean pH	Sorbitol mean pH	t	df	P
24	5.12	7.77	15.49	7	.001

*Large sample test on a mean of paired differences was used.

Table F • Staphylococci. Statistical evaluation of differences between sorbitol and sugar-free control after 24-hour incubation periods*

Hours	Sorbitol mean pH	Sugar-free control mean pH	t	df	P
24	7.77	7.80	.30	7	.60 < P < .80

*Student-Fisher Test for small samples was used.

Table G • Yeast. Statistical evaluation of differences between glucose and sorbitol after 24-hour incubation periods*

Hours	Glucose mean pH	Sorbitol mean pH	t	df	P
24	5.81	7.43	9.32	13	.001

*Student-Fisher Test for small samples was used.

Table H • Yeast. Statistical evaluation of differences between sorbitol and sugar-free control after 24-hour incubation periods*

Hours	Sorbitol mean pH	Sugar-free control mean pH	t	df	P
24	7.43	7.65	1.40	13	.10 < P < .20

*Student-Fisher Test for small samples was used.

Table I • Lactobacilli on basic media containing 0.1 per cent glucose. Statistical evaluation of differences in fermentability of glucose and sorbitol after 12 and 30-hour incubation periods*

Hours	Glucose mean pH	Sorbitol mean pH	t	df	P
12	4.94	6.09	5.25	36	.001
30	4.45	5.67	9.28	26	.001

*Student-Fisher Test was used for 12-hour values, but since the ratio of the two estimated variances was significantly great, Welch's approximate test for the difference of means was used for 30-hour values.

Table J • Lactobacilli on basic media containing 0.1 per cent glucose. Statistical evaluation of differences between sorbitol and sugar-free control after 12 and 30-hour incubation periods*

Hours	Sorbitol mean pH	Sugar-free control mean pH	t	df	P
12	6.09	6.26	1.47	30	.10 < P < .20
30	5.67	6.28	4.22	36	.001

*Student-Fisher Test was used for 30-hour values, but since the ratio of the two estimated variances was significantly great, Welch's approximate test for the difference of means was used for 12-hour values.

Table K • Titratable acidity of mixed saliva-broth cultures. Statistical evaluation of differences between glucose and sorbitol after 24-hour incubation periods*

Hours	Glucose mean cc. NaOH	Sorbitol mean cc. NaOH	t	df	P
24	13.17	3.40	31.22	28	.001

*Student-Fisher Test was used.

Table L • Titratable acidity of mixed saliva-broth cultures. Statistical evaluation of differences between sorbitol and sugar-free control after 24-hour incubation periods*

Hours	Sorbitol mean cc. NaOH	Sugar-free control mean cc. NaOH	t	df	P
24	3.40	1.69	5.80	28	.001

*Student-Fisher Test was used.

tained as controls. All pH determinations were made on a Coleman battery electrometer.

After several trials the procedure was varied to secure better growth of lactobacilli and streptococci. Flasks containing 50 cc. each of the previously described medium with the addition of 0.1 per cent glucose were inoculated with 1.0 cc. of an 18-hour broth culture. The flasks were then incubated for 18 hours before adding the substances to be fermented.

Heavy growth was obtained in each instance by this method; conditions in the mouth were more closely approximated since all human diets contain some glucose or sucrose. The method provided the further advantage of supplying sufficient material to allow a plate culture each time a sample was removed for a pH determination. In this way it was possible to check on possible contaminations throughout the course of the study. The results, however, closely resembled those of the first series in which the 0.1 per cent glucose was not added.

The saliva of 29 caries-susceptible patients was obtained in order to determine the titratable acid produced from saliva-broth cultures containing either glucose, sorbitol, Sorbo or glycerol. Determinations were made after 3, 6, 12 and 24-hour incubation periods by titrating 5 cc. of the saliva-broth culture with fortieth-normal sodium hydroxide.

RESULTS

The sorbitol and the Sorbo did not yield significantly different results, so the latter is not listed in most of the tables.

The mean pH values obtained after lactobacilli had been incubated with glucose, sorbitol, Sorbo, or glycerol broths for 3, 6, 12, 24, 30 and 168 hours are compared with the mean pH values for the sugar-free control in Table 1. The spread of these pH values is listed in Table 2. Within 12 hours glucose and sorbitol differed widely in their ferment-

Table 3 • Streptococci—pH of broth cultures of single strains after 24 hours' incubation

Strain no.	Glucose	Sorbitol	Glycerol	Control
Enterococci—24 hours' growth				
568 faecalis	4.8	5.3	7.0	7.95
550 faecalis	4.8	7.2	7.3	7.3
551 faecalis	4.5	7.2	7.3	7.3
570 faecalis	4.75	5.1	7.4	8.0
571 faecalis	4.8	7.75	7.8	7.95
574 faecalis	4.8	7.8	7.9	8.05
575 faecalis	4.75	7.6	7.7	8.0
581 faecalis	4.6	5.0	6.9	7.9
582 faecalis	4.7	5.1	6.8	7.75
544 faecalis	4.7	5.1	7.2	8.0
494 faecalis	4.7	7.15	7.75	8.0
535 zymogenes	4.8	7.7	7.7	7.9
538 liquefaciens	4.8	7.7	7.75	7.9
604 zymogenes	4.7	5.0	7.1	7.85
500 liquefaciens	4.75	7.65	7.7	7.9
506 liquefaciens	4.65	4.9	6.35	7.65
515 liquefaciens	4.7	4.9	6.2	7.65
17 strains				
Salivarius—24 hours' growth				
572	4.75	7.15	7.3	7.3
545	4.6	7.3	7.4	7.4
591	4.7	7.25	7.4	7.4
592	4.55	7.2	7.3	7.4
601	7.4	7.5	7.65	7.5
602	4.5	7.4	7.2	7.5
529	4.7	7.4	7.7	7.8
533	4.5	7.4	7.3	7.4
603	4.5	7.3	7.05	7.4
9 strains				
Thermophilus—24 hours' growth				
597	5.05	7.8	7.7	7.9
598	4.8	7.3	7.3	7.3
599	5.35	7.3	7.5	7.3
610	5.0	7.7	7.7	7.7
531	4.9	7.1	7.1	7.15
537	5.1	7.7	7.7	7.9
613	5.0	7.3	7.3	7.3
614	5.1	7.2	7.3	7.3
8 strains				
Viridans (unclassified)—24 hours' growth				
562	4.7	5.2	7.4	7.5
565	6.75	6.75	7.2	7.4
559	4.8	7.7	7.85	7.95
557	7.8	7.9	7.9	7.9
576	6.1	7.2	7.3	7.3
546	4.4	7.7	7.6	7.8
547	4.4	7.7	7.65	7.8
548	4.5	7.6	7.6	7.4
549	4.5	7.6	7.6	7.5
583	5.2	7.75	7.6	7.75
600	4.9	7.9	7.7	7.95
539	5.0	7.8	7.9	7.95
542	4.7	5.6	7.1	7.3
543	4.8	7.8	7.8	7.9
14 strains				
Anhemolyticus (unclassified)—24 hours' growth				
555	4.6	5.2	7.35	7.4
584	4.9	7.3	7.35	7.4
2 strains				

Table 4 • Staphylococci—pH of broth cultures of single strains after 24 hours' incubation

Strain no.	Glucose	Sorbitol	Sorbo	Glycerol	Control
567 albus	6.3	7.85	7.85	7.7	7.9
596 albus	5.1	7.75	7.75	7.0	7.8
605 albus	4.8	7.65	7.65	7.15	7.8
607 albus	4.85	7.3	7.3	7.1	7.4
609 albus	4.9	8.0	7.9	7.35	7.5
593 aureus	4.95	7.7	7.65	7.65	8.0
606 aureus	5.0	8.1	8.1	7.8	8.2
608 aureus	5.0	7.8	7.75	7.8	7.8
8 strains					

Table 5 • Yeasts—pH of broth cultures of single strains after 24 hours' incubation

Strain no.	Glucose	Sorbitol	Sorbo	Glycerol	Control
553	5.55	7.0	7.0	7.8	7.58
554	5.5	7.75	7.7	7.4	7.62
569	5.2	7.5	7.6	7.6	7.6
573	4.7	5.3	5.3	7.2	7.55
585	6.2	7.5	7.5	7.5	7.55
586	6.05	7.5	7.5	7.6	7.6
588	6.2	7.8	7.8	7.8	7.85
594	4.95	7.7	7.7	7.65	7.65
536	4.9	7.6	7.6	7.6	7.6
640	6.7	7.75	7.6	7.7	7.7
662	6.1	7.6	7.65	7.65	7.7
663	6.55	7.65	7.65	7.65	7.7
664	6.25	7.75	7.65	7.7	7.7
666	6.4	7.6	7.65	7.65	7.7
14 strains					

Table 6 • Mean pH of broth control and sugar broths of lactobacilli cultures—original medium containing 0.1 per cent glucose

Time	Glucose	Sorbitol	Sorbo	Glycerol	Control	No. strains
Bef. noc.	6.4	6.4	0	6.4	6.4	19
3 hr.	5.73	6.28	0	6.37	6.38	19
6 hr.	5.47	6.19	0	6.32	6.33	19
12 hr.	4.94	6.09	0	6.23	6.26	19
24 hr.	4.52	5.84	0	6.1	6.28	18
30 hr.	4.45	5.67	0	6.14	6.28	19

ability by lactobacilli. Sorbitol, glycerol and the sugar-free control were essentially the same. The 24 and 30-hour readings indicated that considerable acid was produced in the glucose cultures. Although more acid was produced in the sorbitol than in the glycerol cultures by this time, the pH was still not sufficiently low to be of any great clinical importance.

After one week, sufficient acid had been produced in both the glucose and sorbitol lactobacillus cultures to be of clinical interest. The glycerol and sugar-free control pH values remained unimportant.

The statistical validity of the differences between the glucose and sorbitol cultures and the sugar-free controls after 12, 30 and 168 hours is demonstrated in Tables A and B. It can be seen that these differences were not due to chance.[4]

The observations with respect to the common oral streptococci are listed in Table 3. The mean values are treated in Tables C and D. Within 24 hours the streptococci produced sufficient acid from glucose to be of clinical interest. Although the sorbitol cultures produced some acid, neither they nor the glycerol cultures departed widely from the sugar-free controls.

From Table 4 and Tables E and F, it is apparent that glucose was fermented by the common oral staphylococci, whereas sorbitol and glycerol yielded a negligible amount of acid.

Table 5 and Tables G and H indicate that similar results were obtained in yeast cultures. Although acid was produced from glucose, the pH of sorbitol and

4. Dixon, W. J., and Massey, F. J., Jr. Introduction to statistical analysis. New York, McGraw-Hill Book Co., 1951, chapter 9.

Table 7 • Lactobacilli—variation in pH of broth cultures. Originally 0.1 per cent glucose media

Sugar	No. strains	7.4-7.1	7.0-6.5	6.4-6.1	6.0-5.6	5.5-5.1	5.0-4.6	4.5-4.0	3.9-3.8
					3 hours				
Glucose	19	0	1	2	10	5	1		
Sorbitol	19	1	2	14	4	0	0		
Glycerol	19	0	2	16	1	0	0		
Control	19	1	7	11	0	0	0		
					6 hours				
Glucose	19	0	2	0	2	13	2		
Sorbitol	19	1	2	12	4	0	0		
Glycerol	19	1	1	16	1	0	0		
Control	19	1	0	17	1	0	0		
					12 hours				
Glucose	19	0	0	2	0	2	14	1	
Sorbitol	19	1	1	5	11	1	0	0	
Glycerol	19	1	0	15	3	0	0	0	
Control	19	1	0	17	1	0	0	0	
					24 hours				
Glucose	18	0	0	0	0	1	7	10	
Sorbitol	18	1	0	0	14	3	0	0	
Glycerol	18	1	0	12	5	0	0	0	
Control	18	1	0	17	0	0	0	0	
					30 hours				
Glucose	19	0	0	0	0	0	5	14	
Sorbitol	19	1	0	1	8	8	1	0	
Glycerol	19	1	0	12	6	0	0	0	
Control	19	2	0	15	2	0	0	0	

Table 8 • Titratable acidity (cc. 1/40 N sodium hydroxide required to neutralize 5 cc. saliva-broth cultures)

Saliva no.	Before incub.	After 24 hr. incubation			
		Glucose cc.	Sorbo cc.	Glycerol cc.	Control cc.
1	2.1	14.1	2.6	2.0	2.1
2	2.1	13.4	3.4	1.8	2.4
3	2.1	13.7	6.0	2.1	1.6
4	2.1	12.9	3.2	1.8	2.0
5	1.8	14.0	4.3	2.5	2.5
6	1.8	13.9	4.1	1.2	2.1
7	1.8	14.5	2.4	1.9	2.2
8	1.8	11.9	2.2	1.8	1.9
9	1.8	12.3	2.9	1.9	1.4
10	1.6	12.7	1.8	1.9	1.4
11	1.6	12.4	2.9	1.9	2.4
12	1.6	14.1	7.9	1.1	1.0
13	1.6	13.4	1.8	1.7	1.8
14	1.6	10.3	1.9	1.3	1.4
15	1.7	13.4	3.9	2.2	1.6
16	1.7	12.8	2.6	2.1	1.6
17	1.7	14.6	2.6	1.4	1.5
18	1.5	9.8	1.7	1.8	1.4
19	1.5	14.5	2.9	1.4	1.3
20	1.7	12.8	3.9	1.1	1.1
21	1.7	13.1	3.6	1.2	1.9
22	1.6	11.6	5.4	1.6	1.7
23	1.6	15.6	2.2	1.7	1.7
24	1.6	12.8	2.9	1.7	1.4
25	1.6	15.2	5.4	1.1	1.4
26	1.6	13.5	4.7	1.4	1.4
27	1.6	14.2	2.1	1.6	1.7
28		13.6	4.6	1.7	1.4
29		11.1	2.6	1.3	1.6
Av.	.71	13.17	3.40	1.66	1.69

glycerol was similar to that of the sugar-free control.

Tables 6 and 7 and Tables I and J show data obtained when 0.1 per cent glucose was added to the basic media; it can be seen that the addition made no difference in the final result as to the comparative fermentability of glucose, sorbitol and glycerol.

Table 8 and Tables K and L indicate that although enough titratable acid to be of statistical significance was produced by the saliva-Sorbo cultures within 24 hours, the amount produced by the saliva-glucose cultures was much greater. This was to be expected from the results obtained by the pH determinations.

CONCLUSIONS

In vitro studies indicate that sorbitol is not fermented as rapidly as glucose by the common oral microorganisms. Within 24 hours all strains studied produced sufficient acid from glucose to decalcify teeth; this was not true of sorbitol. Glycerol was fermented least of all.

At the end of one week, the mean pH of the sorbitol-lactobacillus cultures was 5.1. It is not likely that sorbitol would remain in the mouth for so long a time; however, if fermentable substrate is retained on or within the tooth structure during the caries process, the fermentation of sorbitol could conceivably be of some importance.

The Need for Technical Vocabularies • It is an indispensable requisite of science that it should have a recognized technical vocabulary, composed of words so unattractive that loose thinkers are not tempted to use them. . . . I wish you would reflect seriously upon the moral aspect of terminology. *Charles Sanders Peirce to William James.*

Controlled water-addition technic for hygroscopic expansion of dental casting investment

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Since Taggart[1] first described the precision casting process for gold dental structures, there has been a continued effort to improve the method of casting and control of the accuracy of the cast gold inlay. Even though the search for a method to produce accurate castings simply and easily has continued for approximately 50 years, there still exists much confusion concerning the best way to produce simple inlay-type castings.

Apparently this situation exists because during the years since the casting process was introduced there have been numerous methods and materials recommended. Each of the methods has involved some basic principle on which the success of the technic rests. In the hands of many skillful operators, any one of several recommended technics apparently is satisfactory to produce acceptable castings, but the results obtained by other operators have not always been so satisfactory. Often this lack of satisfaction with the results obtained when using one method has led to the introduction of another alteration in the procedure which further confused those who wished to employ the technic.

Since the accuracy of the fit of the casting depends to a large degree on the correct compensation of the shrinkage of the gold alloy as the alloy freezes in the mold, some casting technics make use of any, or all, of the known variables that control the mold size. The two main methods of compensation depend on either the thermal expansion of the mold, or the hygroscopic setting expansion of the investment mass. Actually, each of these is active to some degree in any method, but one predominates to produce the major degree of expansion. Variables that are common to all methods involve investment powder:water ratio; time and speed of spatulation; changes in the wax pattern; hygroscopic, setting and thermal expansion of the investment mold, and the time, temperature and manner of wax elimination from the mold, as well as other less obvious variables. Although it may be agreed that

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1. Taggart, W. H. New and accurate method of making gold inlays. D. Cosmos 49:1117 Nov. 1907.

no known method for making acceptable precision castings is available in which there is not a need for careful discipline and control of each operation, it seems certain that some methods are overcomplicated or lack convenience of control.

It is the purpose of this paper to describe a technic for hygroscopic expansion of dental casting investment by means of controlled additions of water to the mixed investment mass surrounding the wax pattern. The method is simple to follow, requires no elaborate equipment and offers a means of producing the desired degree of expansion by changing the amount of water added. In principle, the method depends on the addition of a definite, controlled amount of water to the investment mass, to produce a definite and controlled amount of mold expansion.

REVIEW OF LITERATURE

Although the principle of hygroscopic expansion has been recognized for the last 20 years as a means of mold expansion in the casting process, the use of controlled water additions to produce controlled mold expansion is a recent development from the Physical Research Laboratory of the University of Michigan School of Dentistry.[2,3] Scheu[4-6] is generally recognized as being the first to apply hygroscopic expansion in inlay casting practices as the main source of mold expansion. He determined that if the investment mass was placed in water during the time it was setting, it expanded enough to compensate for the gold alloy shrinkage. This technic subsequently became known as the water bath, or immersion, technic for hygroscopic expansion. During his studies, Scheu also determined a number of variables that influence the degree of expansion to be expected from the investment when the water bath method is employed.

Since the initial studies of Scheu, there have been reported several other investigations of the hygroscopic behavior of dental casting investments.[7] Hollenback[8-9] has contributed to the popularity of the hygroscopic method of mold expansion by advocating a technic that combines mechanical and vacuum spatulation with the water bath procedure for expansion. This technic likewise makes use of an immersion bath at 100°F., and the wax is eliminated from the mold by suction rather than in a heated furnace. Hollenback also called attention to numerous variables which must be controlled if the technic is to be successful.

After the recommendation of the water bath technic as a practical means of compensating for the gold alloy shrinkage during casting, a number of investigators described studies designed to measure the hygroscopic expansion to be expected from dental casting investments.[10-16] As

2. Asgers, K.; Mahler, D. B., and Peyton, F. A. Hygroscopic technique for inlay casting using controlled water additions. J. Pros. Den. 5:711 Sept. 1955.

3. Asgarzadeh, K.; Mahler, D. B., and Peyton, F. A. Behavior and measurement of hygroscopic expansion of dental casting investment. J. D. Res. 33:519 Aug. 1954.

4. Scheu, C. H. New precision casting technic. J.A.D.A. 19:630 April 1932.

5. Scheu, C. H. Precision casting utilizing hygroscopic action of plaster in investment in making expanded molds. J.A.D.A. 20:1205 July 1933.

6. Scheu, C. H. Controlled hygroscopic expansion of investment to compensate for shrinkage in inlay casting. J.A.D.A. 22:452 March 1935.

7. Smyd, E. S. Factors which influence casting accuracy: a universal casting technic. J.A.D.A. 36:160 Feb. 1948.

8. Hollenback, G. M. Precision gold inlays made by a simple technic. J.A.D.A. 30:99 Jan. 1943.

9. Hollenback, G. M. Simple technic for accurate castings: new and original method of vacuum investing. J.A.D.A. 36:391 April-May 1948.

10. Degni, F. Study of hygroscopic setting expansion of dental investments. Thesis, Dental School, Northwestern University, 1946.

11. Landgren, N., and Peyton, F. A. Hygroscopic expansion of some casting investments. J. D. Res. 29:469 Aug. 1950.

12. Docking, A. R. Hygroscopic setting expansion of dental casting investments. Austral. J. Den. 52:6 Jan. 1948.

13. Docking, A. R.; Chong, M. P., and Donnison, Joan A. Hygroscopic setting expansion of dental casting investments—Part 2. Austral. J. Den. 52:160 May 1948.

14. Docking, A. R.; Chong, M. P., and Donnison, Joan A. Hygroscopic setting expansion of dental casting investments—Part 3. Austral. J. Den. 52:320 Sept. 1948.

15. Docking, A. R., and Chong, M. P. Hygroscopic setting expansion of dental casting investments—Part 4. Austral. J. Den. 53:261 Sept. 1949.

16. Delgado, V. P., and Peyton, F. A. Hygroscopic setting expansion of a dental casting investment. J. Pros. Den. 3:423 May 1953.

might be expected, the amount of expansion depended to some degree on the method of measurement. From all the studies, however, it became apparent that the expansion was sensitive to many variables of manipulation. The most critical of the variables include the following: (1) the consistency of the initial mix of investment, with the thick mix giving the highest expansion, (2) the amount of spatulation either in time or speed, since the faster and longer the spatulation is, the greater is the hygroscopic expansion of the investment and (3) the age of the investment, with fresh investment producing more expansion than one that is aged. Other factors having an influence on the hygroscopic expansion are the basic nature of the ingredients in the investment, the composition, and the variations resulting in production from one batch to another. It became apparent from the reports of these investigations that the hygroscopic water bath technic was sufficiently critical to demand precise control of the many variables involved, if reproducible results were to be obtained from one casting to another in the same or different laboratories. This control did not always seem possible for all operators to maintain, with variations in practical results reported by numerous persons.

In a later series of investigations, efforts were made in several laboratories to determine the basic nature of the hygroscopic expansion process, with the purpose of presenting an explanation of the expansion phenomenon.[17-19] It was presumed that if the basic mechanism of the process was understood, a simplified and dependable technic might be evolved. Although these studies have contributed much to the understanding of the process of setting and expansion mechanisms in dental casting investment, there still remain numerous unsolved problems related to the fundamental behavior of these materials.

Recent studies on the reproducibility of gold casting and evaluations of existing casting technics have shown that low temperature burning-out procedures and hygroscopic methods of expansion of the investment mass have some merit and basis of justification.[20-22] It was from such studies on the basic nature of hygroscopic expansion that the controlled water-addition technic was developed.

DETAILS OF WATER-ADDITION TECHNIC

The Wax Pattern • The basis of any successful casting is a satisfactory and accurate wax pattern. Many methods have been recommended for this operation, and the method of choice of the operator should be employed. It should be remembered, however, that wax patterns are subject to distortion because of the release of internal stresses. This distortion is more pronounced when the pattern has been formed by some methods than by others; in any instance the pattern should be invested promptly after it is formed, so that the warpage will be kept to a minimum. Before investing, the pattern should be checked carefully for such factors as marginal adaptation, sharpness of pattern details and the relative adaptation to the die or tooth.

When the pattern has been finished, a suitable sprue pin should be firmly attached to the pattern. For most average dental castings, a 14 gauge sprue should

17. Mahler, D. B., and Asgarzadeh, K. Volumetric contraction of dental gypsum materials on setting. J. D. Res. 32:354 June 1953.

18. Lyon, H. W.; Dickson, G., and Schoonover, I. C. Mechanism of hygroscopic expansion in dental casting investments. J. D. Res. 34:44 Feb. 1955.

19. Ryge, Gunnar, and Fairhurst, C. W. Hygroscopic expansion. Paper read before the dental materials group, International Association for Dental Research, March 19, 1955.

20. Suffert, L. W., and Mahler, D. B. Reproducibility of gold castings made by present day dental casting technics. J.A.D.A. 50:1 Jan. 1955.

21. Lund, M. R., and Nixon, C. T. Evaluating gold inlay casting technics. Thesis, School of Dentistry, University of Michigan, June 1954.

22. Port, F. C. Thermal expansion of the new investment designed for the controlled water-added hygroscopic technic. Thesis, School of Dentistry, University of Michigan, August 1955.

be acceptable. The hollow metal sprue has been found to be desirable, since it does not hold excess heat that would cause pattern warpage. Other types of sprues, such as solid metal or plastic, may be used at the discretion of the operator. For very small castings it may be necessary to use an 18 gauge sprue, whereas a large full crown may demand a 12 gauge sprue to permit the metal to flow into the mold. To prevent distortions in the casting, it is often desirable to employ a multiple sprue on the bulky mesio-occlusodistal type restoration. In general, too long a sprue may cause shrinkage porosity in the casting, and a sprue too large in diameter will allow the metal to enter the mold too rapidly to permit the gases to escape through the investment.

When the pattern is attached to the sprue, it is then mounted in a suitable position in one of the rubber sprue formers provided for the water-addition technic. The sprue should be kept as short as possible, with the pattern preferably not more than 3 to 4 mm. from the rubber sprue former. A surface tension reducing, or "wetting," agent is applied liberally to the surface of the wax pattern, and the excess is removed carefully by the use of a dry brush. To blow the excess off the pattern with air may cause warpage of the pattern due to chilling, or cause a nonuniform film to result because of incomplete removal.

Mixing and Applying Investment • Although all commercial investments possess some degree of hygroscopic expansion whether or not they are intended for that use, the amount of hygroscopic expansion in these investments is inadequate for use with the water-addition technic.[2] Accordingly, investments which have ample expansion have been made available by two dental manufacturers for specific use with this water-addition technic (Aquascopic, The Ransom and Randolph Co., and Hygrotrol, Whip-Mix Corp., Inc.). Either of these investments will produce a definite controlled hygroscopic expansion, when a definite and controlled amount of water is added to the mixed mass of investment surrounding the wax pattern in the ring.

For this technic it has been necessary also to develop flexible rubber rings to form the investment mold, which replace the conventional metal ring and asbestos liner.[2] These rings are approximately the same size as the familiar metal rings, but have the advantage in that there is no restriction to the lateral expansion process. This rubber ring is, of course, subsequently removed from the investment mass after the setting process, and the wax is eliminated from the mold without any ring surrounding it. The rubber rings are available from the two manufacturers of investment for this technic, and specific instructions as provided by the manufacturers for the proper use of these rings should be followed.

With either of the two specially developed investment materials, an accurately weighed quantity (50 Gm.) of investment is added to a carefully measured quantity (16 ml.) of water at room temperature. The mass may then be mixed either by a hand-driven or vacuum mechanical spatulator. There must be the same degree of spatulation from one mix to another or from one method to another. In general, 100 turns of the hand-driven mechanical spatulator is sufficient. If the Hollenback-type vacuum spatulator is employed, the mixing time is 45 seconds, whereas it is only 15 to 20 seconds if the Whip-Mix Vac-U-Spat unit is employed, because of the greater speed of rotation of this instrument.

After the mass has been spatulated for the prescribed time, the mass in the mixing bowl may be vibrated vigorously for three or four seconds to release trapped air bubbles. Excessive vibration at this point is unnecessary.

Either a vacuum investing technic or a hand painting and investing technic may

be employed to fill the rubber rings. The manufacturers have provided a metal sleeve which may be placed over the rubber ring so that the ring will not collapse when vacuum is applied. The usual instructions for vacuum investing are then followed to fill the ring.

When the hand method of investing is used, the pattern is painted by teasing the investment ahead of the brush. After the pattern has been completely covered with investment, the painted pattern on the rubber sprue former is surrounded with the rubber ring. The metal sleeve is then placed around the rubber ring to give added reinforcement. The rubber ring, with the metal sleeve in position, is then held in one hand, tilted slightly, and the remaining investment mass is flowed into the ring. Only a little vibration is necessary to settle the investment in the ring; too much vibration tends to cause bubbles around the pattern. Vacuum investing reduces the tendency for trapped bubbles around the pattern, but otherwise the results from either vacuum or hand investing technics are comparable.

After the ring has been completely filled with investment, the metal sleeve must then be gently removed immediately, so that the expansion of the mass is not restricted. Immediately after the metal sleeve is removed from the rubber ring, the surface is made level with the top of the ring by striking off the excess with a plaster spatula, and a metal collar, or reservoir, is inserted into the top of the investment in the rubber ring. This reservoir receives the water that is added to produce the hygroscopic expansion in the investment mass. The water is added from a 2 ml. syringe, which is calibrated to 0.1 ml., immediately after the reservoir has been placed in position.

When a two-surface, or Class II, type of inlay is being formed, 0.1 ml. less of water is used than for all other types of pattern. For example, when the Aquascopic investment is employed, 1.0 ml. of water is added to the investment in the ring for a two-surface pattern, but 1.1 ml. is used for all other types of pattern. To Hygrotrol investment it is necessary to add 1.2 ml. of water for compensation of the two-surface pattern, but 1.3 ml. is needed for all other types of castings. The total amount of water added depends not only on the choice of investment, but also on the size of the rubber ring employed. Obviously a larger ring would require a greater volume of water, if the percentage added were to remain constant. This is also the reason that the rubber ring is uniformly filled each time, but not overfilled.

After the controlled amount of water has been placed in the reservoir on the investment in the rubber ring, it should be left undisturbed for at least 45 minutes. During that time, the water will be absorbed by the investment, and the setting process will be completed. It is during this period that the required hygroscopic expansion will occur. Also, during this period, sufficient strength will be developed in the investment to permit the mold to have hot metal cast into it without being fractured. The investment may be left in the rubber ring for as long as overnight without damage to the invested pattern.

When the investment mass has been allowed to set in the ring for 45 minutes, the reservoir and rubber ring are removed. The mold is separated from the sprue former, and the sprue pin is withdrawn. The mold is then placed in a preheated oven at a temperature of 850°F. for one hour. Initially it is desirable to place the mold in the oven with the sprue hole down and to allow it to remain in this position until the bulk of the wax has drained from the mold. This process will require approximately 15 minutes in the oven preheated to 850°F. After this time, the mold is inverted to have the sprue hole up for the remainder of the burning-out period. This practice seems particularly advisable

in view of the low burning-out temperature employed. It has not been found necessary to surround the mold with warm water to soften the pattern or to employ a syringe to remove the wax from the mold. Slow heating of the mold from room temperature to 850°F., or short heating periods above this temperature, likewise are not recommended.

After the mold has been heated for the recommended period, the melted gold alloy is cast into the mold with the use of a centrifugal casting machine. There must be no ring around the investment mold. Caution should be used to avoid too much pressure on the casting machine, and care should be exercised to make certain that the gold alloy is well melted. Failure to observe either of these precautions may lead to the formation of incomplete castings. After the casting operation has been completed, the mold with the casting may be plunged into water at a time when the sprue button is losing its red color. For alloys that respond to heat treatment, this immersion will leave the casting in a softened condition. If allowed to cool to room temperature in the mold, the alloy will be in a hardened condition.

MERITS OF TECHNIC

This technic appears to have certain merits from the standpoint of producing consistently well-fitting castings. Some of these qualities have been enumerated and described in detail in a previous publication.[2]

There seems to be sufficient evidence available, both from clinical studies and from laboratory investigations, to indicate that low temperature wax elimination procedures produce castings with desirable smooth surfaces. The temperature of 850°F. is sufficiently high to eliminate completely the wax from the mold, yet not cause excessive deterioration and breakdown of the investment mass when heated for a period of one hour. Recent studies have indicated that when this temperature is employed, a limited variation in burning-out time is possible without impairment of either the fit of the casting or its surface smoothness.[22] When the procedure described here and a burning-out period up to two hours were employed, the quality of the casting was still acceptable. It appears, therefore, that the burning-out time is somewhat less critical than with some other recommended, high-temperature technics.

Previous studies with this technic have revealed that ample compensation for the shrinkage of the cast gold alloy can be accomplished by this technic. It has been shown also that the accuracy of reproduction, or fit of the casting, resulting from the use of this technic is superior to that resulting from the use of many other procedures.[2,21] This desirable quality appears to be related to the fact that by the use of investments designed for this technic, and by the use of the method outlined, many of the variables of manipulation common to all other technics are eliminated. Although careless measuring of powder and water, spatulation time and rate, and other factors cannot be reconciled with any technic, such factors seem to be less critical with this technic than with others.

A factor of greatest significance is that the operator has at his disposal by this technic a means of increasing or decreasing the dimensions of the casting simply by adding more or less water to the investment mass surrounding the wax pattern.[2] Since the fit of castings for practical use is judged differently by different operators, it may be desirable for some dentists to add more or less water to the investment mass than others. With this technic, such flexibility is possible.

This technic has been developed with attention given to simplicity of equipment necessary to accomplish the operation. The main items of equipment are the rubber ring assembly with the metal sleeve and reservoir, together with a suit-

able hypodermic syringe or other carefully calibrated instrument for adding the water to the investment mass in the ring. As is true with any acceptable casting technic, means should be available to measure the water and weigh the powder for the initial mix of investment. The technic is applicable to all the recognized methods of spatulation and investing procedures. The technic accordingly is considered simple and inexpensive.

SUMMARY

A technic for hygroscopic expansion of dental casting investment by means of controlled additions of water to the mixed investment mass surrounding the wax pattern has been developed. The special features of this technic are summarized as follows:

1. An investment material is selected which possesses ample hygroscopic expansion.
2. Little extra equipment is necessary: the rubber ring assembly with the metal sleeve and reservoir and a hypodermic syringe for adding water to the investment mass are needed.
3. The period of burning-out of the wax can be varied somewhat with the low temperature (850°F.) wax elimination procedure employed in this technic.
4. The dimensions of the casting are increased or decreased by the addition of more or less water to the investment mass surrounding the wax pattern.

The report has been presented primarily to describe the details of the procedure rather than to describe the background of research on which the technic is based.

Element 101 Discovered • The discovery of element 101—a synthetic unit of matter that does not exist in nature and has never before been observed on earth, has been reported by the University of California. Element 101, called meldelevium (chemical symbol Mv) after the Russian chemist, Dimitri Ivanovich Mendeléeff (1834-1907), who developed the periodic system, is the heaviest atom known. This new element was created by bombarding the element 99, another synthetic form of matter, with 41 million electron-volt alpha particles, the nuclei of helium atoms, fired from the 60 inch Crocker cyclotron of the University of California. Mendelevium is intensely radioactive, and was created from about 1 billion element 99 atoms—a quantity too small to be seen. Scientists were able only to identify 17 atoms of mendelevium in eight experiments, an invisible, unweighable and almost unimaginably small amount of atomic matter. *Science Digest 19:9 Oct. 1955.*

Dimensional, form and hardness changes of dies for indirect dental technic

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To make well fitting inlays and crowns by indirect methods, it is necessary to reproduce their original dimensions. Therefore, the properties of the materials and the influence of clinical manipulations on these properties must be known in order to find rational technics and satisfactory materials.

The true differences between original preparations and working dies cannot be calculated by the algebraic sum of the dimensional changes of the impression and die materials, because of the physiochemical reactions of the impression and die materials on each other. The dimensional changes can be known exactly only by comparing the dimensions of the die directly with those of the original models.

In studying the accuracy of inlays and crowns, it is important to measure both outside wall and inside wall distances of dies. There will be errors in the measurements of side wall distances because of the roughness of die surfaces, but these have to be contended with in clinical practice. The fit of inlays or crowns depends on the fit of wax patterns on the dies.

The original dies used in such measurements must have tapered walls to prevent distortions and errors on removing impressions. Special gauges had to be devised for measuring the side wall distances of such tapered models or dies.

The more the sizes and forms of specimen dies resemble those of clinical cases, the more valuable will be the data. The experimental data on specimens of impractical sizes and forms, for instance, 10 or 25 times bigger than the actual sizes, may give misleading results.

To obtain useful data on the fit of inlays or crowns, the dies must be compared with the original models and the dimensional changes measured with a precision of at least 0.1 per cent and preferably 0.01 per cent. To carry out such precise studies, the author developed two methods of measurement, one in which discordance measuring gauges were used for the main experiments, and another in which outside and inside wall distance comparative measuring gauges were used for the complementary experiments. These two methods made it possible to study indirect dental technic in a new fashion.

The dimensional changes of various dies of almost all currently used materials and methods were measured by these procedures, and the influence of varying clinical conditions on such errors was studied. The influence of time and of separating mediums on the completed dies was also studied experimentally.

Impression compound and alginate hydrocolloid were used as impression materials. Hydrocal, phosphosilicate cement,

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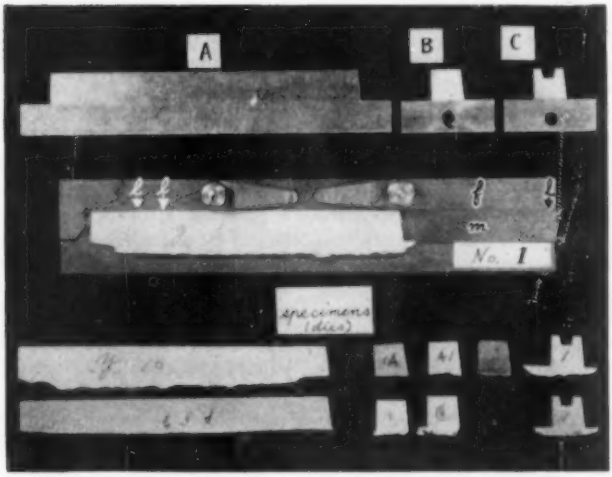

Fig. 1 • Original models of plate form—A, B, C. The discordance measuring gauge, No. 1 (f-fixed portion, m-movable piece, l-mark line). Respective specimen dies of plate form

zinc phosphate cement, copper amalgam and silver-tin amalgam were used as die materials. Water, glycerin and petrolatum were used as separating mediums.

The change of hardness in hydrocal dies on soaking in various separating media was measured. Original information of clinical value was obtained from these studies.

MAIN EXPERIMENTS

Measuring Apparatus and Method • A set of tapered original models and the discordance measuring gauges were devised by the author for the main experiments (Fig. 1, 2).

Tapered Side Walls of Original Models • It is difficult to withdraw impressions of original models without distortion unless they are tapered. If they are not tapered, some wearing will occur of the side walls of compound impressions on withdrawing from the original model. For that reason, the side walls of all original models were given a taper of 10 per cent to prevent errors in impressions caused by resistance at the time of withdrawal.

The side wall distances of tapered models or specimen dies must be measured on the same spots on their walls and in the same direction. In the present experiment, a measuring spot 2 mm. from the edge and a direction parallel to the top surfaces was used.

The gauges must touch the side walls by lines and preferably by points so as to minimize the contacting errors. The contact must be of minimum pressure; if it is sharp it will cause the sharp edges of the gauge to injure the surfaces of soft specimens.

Discordance Measuring Gauges • In preliminary experimentation the top surfaces of models were measured by sliding a comparator microscope from one edge to the other, and their thickness was measured with a micrometer caliper. Satisfactory results were not obtained, how-

ever, because of measuring errors of more than 50 microns.

Specially constructed gauges were devised to measure directly the dimensional changes of the specimen dies as compared with the original models. With these gauges the dimensional changes were measured as discordances of the reference lines on the two parts of the gauge, which just coincided when the original model was in the gauge.

A comparator graduated to 1 micron was used to read such discordances (Fig. 3). The discordances were small, ranging from none to several microns. If the comparator had a measuring error of 1 per cent, the error in measuring an object of 10 microns could not be more than 0.1 micron. Therefore the measuring errors also were small, less than 1 micron when the same specimen was measured repeatedly.

Types and Structures of Original Models • Original models used in the main experiments were made of bronze, the coefficient of thermal expansion of which was about 2×10^{-5} per 1° C.

Three original models, (A, B and C) of plate type as shown in Figure 1, were used. They had a 10 per cent taper on their right side walls. Model A was 100 mm. between reference marks, about ten times larger than clinical dies. The changes could be read to ten times the accuracy with it than with 10 mm. dies. This made possible a better comparison of various conditions.

Models B and C were small plates having an effective measuring distance of 10 mm. They had impracticable form but a practicable size. These dies were medium — in between the large plate (Fig. 1, A) and the solid models (Fig. 2), and the data obtained from them were used comparatively.

Four solid models (D, E, F-G and H, Fig. 2) had sizes and forms resembling practical preparations. D, E and F-G were used for measuring outside wall distances and H for measuring inside wall distances. They all had an effective measuring distance of 10 mm.

Models D and E (Fig. 2) had a 5 per cent taper on each side, and E had a transverse channel on its top surface. These dies and their corresponding models were measured with minimum contacting error because they were engaged by point contacts of the gauge.

Model F-G (Fig. 2) had a taper of 10 per cent on one side wall and had a channel on its top surface. This model was measured in two directions—at right angles and parallel to the channel. The measurements made on dies of this type were not entirely accurate and could only be used for purposes of comparison.

Model H (Fig. 2) was a special model of U-form used for inside measurement. However, the specimen dies of H were thought to be distorted when made from alginate impressions, and to show shrinkage between the inside walls when made from impression compound impressions. The readings obtained by measuring with this type were not reliable.

Uses and Structures of Measuring Apparatus • A set of special gauges made of bronze and a comparator microscope were used to measure the dimensional differences between original models and their respective dies.

A special discordance measuring gauge no. 1 (Fig. 1) was devised for plate models A, B and C. This gauge had a fixed portion and a movable piece on its base. The fixed portion (f in Fig. 1) had a hook at the left and the movable piece (m in Fig. 1) was at the right.

At first the original model (A, Fig. 1) was placed on this gauge and held between the hook and the movable piece that was pushed very slightly by finger pressure. Then a fine line was cut on the gauge through its fixed and movable portions (l in Fig. 1). When a stone model was placed in the gauge instead of the original model, the discordance of

the line was defined as the dimensional change of the specimen.

A special gauge no. 2 as shown in Figure 2 was devised for solid models D, E and F-G. Its structure and use resembled the gauge no. 1 (Fig. 1) except that it was smaller and that the specimens were placed on their tops (Fig. 2).

Another gauge (3, Fig. 2) was devised for the model H. The inside walls of the original die or specimen models were caught by the hooks of the fixed portion and of the movable portion. These two gauges also showed the dimensional changes of specimens as discordances of reference lines (1, No. 2, Fig. 2).

A comparator microscope graduated to 1 micron was used for reading the discordance of reference lines (Fig. 3). It is presumed that this comparator had precision of 1 micron in measuring such small discordances as 20 to 30 microns. With this apparatus, therefore, the dimensional changes of specimens 100 mm. long were measured to 0.001 and those 10 mm. long to 0.01 per cent. Such precision is sufficient to obtain clinical references. The experimental data of the following tests had, of course, some deviations of more than 1 micron, but these deviations resulted from instability of impression and die materials, not from inaccuracy of measurement.

Trays for Impression • Various trays were used to take impressions of the models (Fig. 4). Trays a, b, c and d were for alginate and compound impressions of the large and small plate models (A, B, C, Fig. 1). Tray e was for the alginate impression of the D, E, F-G and H models at once. Tray g was for compound impression of models D, E or F-G (Fig. 2). Tray g of the cylinder type was used for compound impressions of models D or E. Tray h, with walls on two sides only, was designed to study the direction of distortion of alginate impressions.

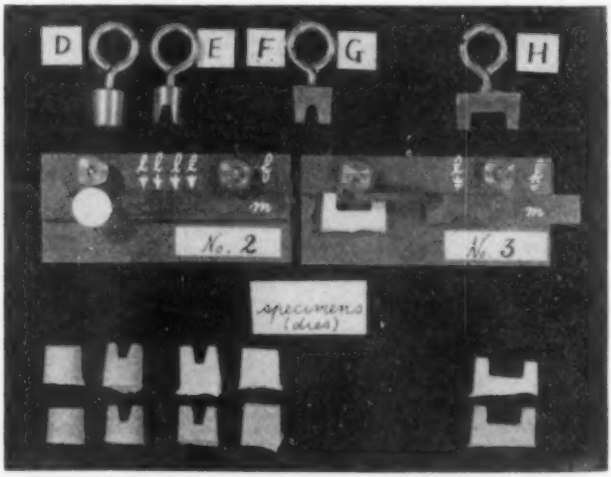

Fig. 2 • Original models of solid form—D, E, F-G, H. The discordance measuring gauges—No. 2, 3 (f-fixed portion, m-movable piece, l-mark line). Respective specimen dies of solid form

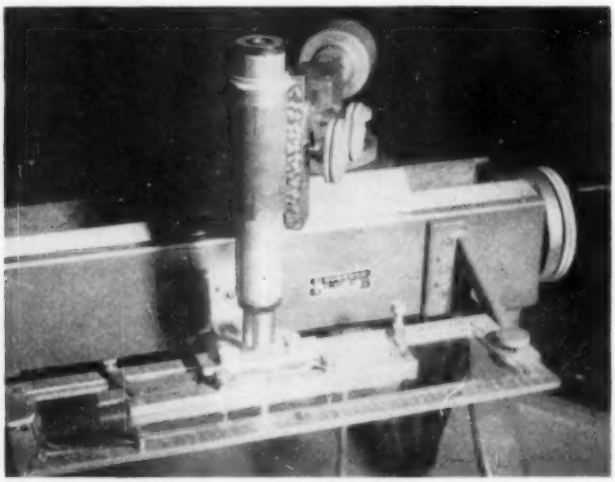

Fig. 3 • Comparator microscope measuring discordance of mark lines on gauge surfaces

Equipment for Controlling Experimental Conditions • The following equipment was used to make the conditions as exact and stable as possible while specimens were being made:

1. Thermostatic box

A box with a bimetallic thermostat and electric lamp heater was used to make temperature and humidity conditions similar to those of the mouth (Fig. 5, center).

2. Thermostatic tank

A tank with a bimetallic thermostat and nickel-chromium wire heater was used to keep water at the desired constant temperature (Fig. 5, right).

3. Humidor

A desiccator with water in the bottom was used to keep 100 per cent relative humidity at room temperature (Fig. 5, left).

Tests and Results in the Main Experiments Using Compound Impressions • Standard conditions and procedures for making specimens were used; one was varied if necessary for the purposes of experiments.

Taking of Impressions and Making of Dies • Original models were impressed with Black Tray Compound made by G. C. Chemical Co. of Japan. This compound was softened in water of 131° F. (55° C.) and the impression was chilled in water of room temperature. The original models were taken out of the impressions after they had been cooled for five minutes.

The impressions were then poured with die materials, which were taken out of the impressions two hours after pouring. Measurements were made 24 hours later as a rule.

The die materials, Plastone (hydrocal made by G. C. Chemical Co.) was used in water-powder ratio 0.3 and Duroc (artificial stone made by Ransom & Randolph Co.) in water-powder ratio 0.24; both were spatulated for 30 seconds. Postelit Cement (phosphosilicate cement made by G. C. Chemical Co.) was used

in powder-liquid ratio 0.35 and was spatulated without division for 30 seconds, and Crystalline Cement (zinc-phosphate cement made by G. C. Chemical Co.) in powder-liquid ratio 0.4 was spatulated in four sections for 90 seconds as a rule. Lunargent alloy (silver-tin amalgam alloy made by G. C. Chemical Co.) and copper amalgam (made by Moriya C. M. Co.) were packed after having been manipulated as directed by the manufacturer. Copper amalgam dies were taken out of impressions and measured two days after packing, because the copper amalgam took nearly two days to set.

Consideration of Thermal Dimensional Changes of Compound Impressions and Bronze Models • The original models surrounded by compound impression were cooled for five minutes in water at room temperature before they were taken out of the impression. Therefore, the cooling shrinkage of the compound was restricted by the outside walls of bronze models, and the compound impressions taken off at room temperature had the same dimensions as the outside wall distances of the models at room temperature. The dies were poured and measured at the same room temperature. In these cases the thermal dimensional changes of the compound and of the models were neglected. It was assumed, however, that the compound would shrink on cooling rather freely between the inside walls of model H in Figure 2, and the data obtained from it were only relative.

Testing Results with Compound Impressions • In measuring dimensional changes of specimen dies as compared with the original models, the following information was obtained:

1. Data on large plate die

With die A (Fig. 1), dimensional changes of ten specimens for each group were averaged. The figures in parentheses are standard deviations.

The dimensional changes under standard conditions of big plate hydrocal models (A in Fig. 1) as compared with the original model were as follows:

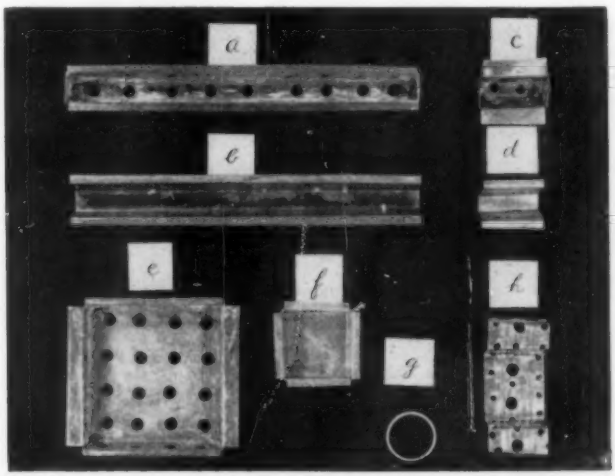

Fig. 4 • Impression trays used for original models

Compound—Plastone
die.....+0.137 (±0.036) per cent
Compound—Duroc
die..... 0.026 (±0.030) per cent

The hydrocal model removed early from the compound impressions expanded well, but the ones taken out more than one day after pouring showed little expansion, as follows:

Plastone die taken out one hour after pouring .....+0.225 per cent
Plastone die taken out two hours after pouring .....+0.140 per cent
Plastone die taken out one day after pouring .....+0.055 per cent
Plastone die taken out two days after pouring .....+0.015 per cent

The supposition is that the compound impressions suppressed the setting expansion of hydrocal models that ordinarily would have continued expanding for about one day after pouring.

2. Data on small plate dies

In the experiments with small plate dies (B and C, Fig. 1) poured in compound impressions, the average of dimensional changes of ten specimens (five each of B and C types) for each group was determined.

The dimensional changes under standard conditions of small plate dies of various materials compared with original models follow:

Compound—Plastone
die .....+0.16 (±0.18) per cent
Compound—Duroc
die .....—0.01 (±0.32) per cent
Compound—phosphosilicate cement
die .....—0.43 (±0.07) per cent
Compound—zinc phosphate cement
die .....—0.57 (±0.07) per cent
Compound—copper amalgam
die .....—0.12 (±0.17) per cent

The more cement liquid that was used in proportion to the powder, the greater was the shrinkage of cement dies as shown by the following:

Phosphosilicate cement die
(L/P 0.35) .....—0.43 per cent
Phosphosilicate cement die
(L/P 0.40) .....—0.55 per cent
Zinc phosphate cement die
(L/P 0.35) .....—0.46 per cent
Zinc phosphate cement die
(L/P 0.40) .....—0.57 per cent

3. Studies on errors in solid dies

In the experiments with compound impressions the most exact data were obtained by simple column dies (D, Fig. 2) and these data were used as standard results. The data on the other models were used only for purposes of comparison. In the column dies with a channel (E, Fig. 2) there was some distortion caused by withdrawal resistance. Large contacting errors were experienced with the MOD dies (F-G, Fig. 2) as the gauge employed a line contact 10 mm. long. Reliable data were not obtained by using model H (Fig. 2) because of the cooling shrinkage of the compound between the inside walls of the model. These errors of the compound during the taking of the impression were reduced by using softer compound warmed in hotter water and by better fitting trays.

The wearing of the side walls of the compound impression through repeated insertion and removal of the original model (D) was as follows:

One insertion.....wear 4 microns
Three insertions.....wear 17 microns
Five insertions.....wear 19 microns

More wear may occur in practice because most tooth cavity walls are rougher than the walls of original models used here. The maximum limit of film thickness of cementing mediums allowed by the American Dental Association Specification for Zinc Phosphate Cement is 40 microns and that of ordinary zinc phosphate cement is about 20 microns. Wearing of the walls may occur in the taking of the compound impressions and the wax pattern, and in the solidification

of the cast metal. It would be too much, therefore, if the wearing of walls of the compound impression were nearly 20 microns. Besides, some irregular fine undercuts of the compound impression may be removed at the first reinsertion. Therefore, such reinserting in the clinic of the compound impression for indirect inlays should be repeated once, never more. This observation corresponds with the author's clinical experience.

The setting expansion of hydrocal dies was limited by suppression of the compound impression as mentioned earlier, but that of copper amalgam seemed scarcely affected. The cement softened the compound impression by its reacting heat during setting; therefore it was dangerous to use pressure during the pouring of cements in compound.

4. Data on solid lines

The average dimensions of ten specimen dies (D, Fig. 2) for various materials as compared with the dimension of the original model under standard conditions follow:

Compound—Plastone
die .....+0.20 (±0.08) per cent
Compound—Duroc
die .....+0.06 (±0.10) per cent
Compound—phosphosilicate cement
die .....—0.33 (±0.37) per cent
Compound—copper amalgam
die .....+0.34 (±0.12) per cent
Compound—silver
amalgam ....+0.51 (±0.16) per cent

The influence of thermal shrinkage of the compound was studied as follows: The measured discordance of the Plastone dies poured in compound impression taken in water of 99° F. (37°C.) was compared with that of the Plastone dies poured in compound impression taken in water of room temperature. Plastone was poured at room temperature of 66° F. (19° C.) in both instances. Considering the 0.03 per cent shrinkage of the bronze model during cooling, this comparison indicated that the cooling shrinkage of compound impression from 99° F. (37° C.) to 66° F. (19° C.) room temperature reduced the die dimension

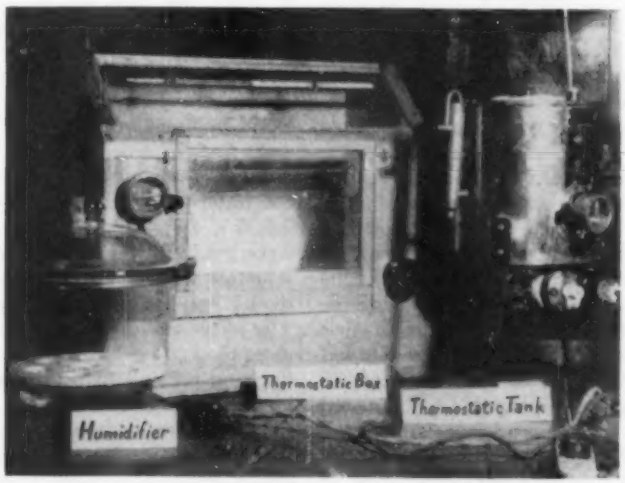

Fig. 5 • Equipment controlling experimental conditions

by 0.32 per cent; namely, about 0.1 per cent 10° F. (6° C.), which agrees with the thermal dimensional change of free compound itself.

The Plastone dies mixed with more water showed less setting expansion, as follows:

Plastone die mixed in water:
powder 0.25 .....+0.27 per cent
Plastone die mixed in water:
powder 0.30 .....+0.20 per cent
Plastone die mixed in water:
powder 0.35 .....+0.11 per cent

The copper-amalgam dies from which excess mercury had not been removed sufficiently showed greater expansion, as the following data show:

Excess mercury:
not removed .....+0.43 per cent
Excess mercury:
half removed .....+0.35 per cent
Excess mercury:
maximum removed ....+0.34 per cent

So far as dimensional changes were concerned, hydrocal was the best die material. The cements showed a lot of shrinkage. Amalgam, which has been regarded as the best die material hitherto, expanded greatly and was unstable. The great expansion in amalgam dies was caused by the fact that it was impossible to remove excess mercury in the compound impression with heavy condensing.

Test and Results in the Main Experiments Using Alginate Impressions • The standard conditions and procedures for making specimens were used; one was varied if necessary for the purpose of the experiments.

Impressions of the original models were taken with the alginate which was mixed with water of room temperature in water-powder ratio of 2.5, spatulated 200 times (one minute) in a rubber bowl, placed in a tray within one minute, impressed on original model which took 30 seconds, and kept in a humidor at room temperature. Then the impressions were fixed in 1 per cent solution of zinc sulfate in water for 30 seconds and kept in the humidor after pouring.

As alginate impression material, Technicol made by the G. C. Chemical Co. of Japan was used. As hydrocal die material, Plastone (made by the G. C. Chemical Co.) in water-powder ratio of 0.30 and Duroc (made by the Ransom & Randolph Co.) in water-powder ratio of 0.24 were used. They were spatulated for 30 seconds and poured. The dies were taken out of the impressions 30 to 40 minutes after pouring and were compared with the original models 24 hours later.

Consideration of Thermal Dimensional Changes of Alginate Impressions and Bronze Models • In most of the following instances, the alginate was set at room temperature and the dies were poured and measured at the same room temperature. Therefore, the thermal dimensional changes of alginate impressions and bronze models can be neglected.

If the alginate set at mouth temperature and the dies were poured and measured at room temperature, a correction of 0.001 per cent per 1° F. (thermal shrinkage of bronze model) was used.

Testing Results with Alginate Impressions •

1. Preliminary tests

At first, in order to know the proper amount of mixing water for the alginate, the water-powder ratios of 2.0, 2.3, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.2, 3.5 and 4.0 were tried. It was difficult to spatulate smoothly with a water-powder ratio less than 2.3 and to obtain a fine die surface. The mixes with a water-powder ratio of more than 3.0 were too soft, slow in setting and difficult to manipulate. It was best at 2.5 and could be used to 3.0.

In order to achieve fine die surfaces, various methods for stabilization of alginate impressions were tried and the following results obtained:

30 seconds in 1 per cent aqueous solution of zinc sulfate . . . . . excellent
5 minutes in 2 per cent aqueous solution of potassium sulfate. . . . . fair
5 minutes in saturated aqueous solution of calcium sulfate. . . . . poor
5 minutes in tap water . . . . . fair
5 minutes in air . . . . . very poor
poured at once . . . . . fair

"Excellent" means the surface of the die was useful for indirect inlay dies. "Fair" means the surface of the die was useful for models for denture work but not useful for inlay dies. "Poor" means too bad to use.

A solution of 1 per cent zinc sulfate seemed to be a good fixing medium because it had an excellent effect when the impression soaked for only 30 seconds and little distortion of alginate could be expected in such a short time.

2. Data on large plate dies

Under standard conditions, the dimensional changes of large plate dies (A type, Fig. 1) when compared with the original model, were as follows: The figures are the averages of ten specimens for each group.

Alginate-Plastone dies
(example 1) . . . . . +0.196 (±0.077) per cent
(example 2) . . . . . +0.438 (±0.105) per cent
Alginate-Duroc dies
. . . . . +0.057 (±0.057) per cent

3. Data on small plate dies

Accurate standard results with alginate-hydrocal dies were not obtained with small plate models. When various groups of dies were compared, however, the following facts were recognized regarding the influence of treatments on the alginate impression before pouring; the group soaked in 1 per cent zinc sulfate solution for 30 seconds was used as a control.

Impression soaked in 1 per cent zinc sulfate for 30 minutes . . . alginate expanded a little. Impression soaked in tap water for 30 minutes . . . alginate expanded considerably. Impression kept in air for 30 minutes . . . alginate shrank. It is dangerous, therefore, to keep the alginate impressions for a long time in water or air, or in fixing solution.

4. Data on solid dies

An alginate impression was taken of four models (D, E, F-G and H, Fig. 1) at one time, and repeated five times for each group.

In alginate impressions, the most accurate results were obtained from model E (Fig. 2) because of its minimum resistance at the time of withdrawal. Some distortion caused by suction at the time of withdrawal was often observed on the alginate impressions taken from the simple column model (D type). The measurements of F-G dies (Fig. 2) seemed to show large contacting errors in the gauge. The H model was suspected to have a distorted opening between its two ends.

Therefore the measurements of model E were used as standard and others were used only for purposes of comparison. In the experiments with these solid models, the dimensional changes under standard conditions of model E replicas as compared with the original model were as follows:

Alginate-Plastone dies
(example 1) . +0.09 (±0.06) per cent
(example 2) . +0.18 (±0.14) per cent
(example 3) . +0.55 (±0.23) per cent

The difference between these three results may stem from lack of uniformity of materials of different manufacturing dates.

When the water-powder ratio for mixing alginate was varied, the following dimensional changes of resultant hydrocal dies were obtained:

Alginate water-powder ratio 2.5 . . . . . +0.03 per cent
Alginate water-powder ratio 3.0 . . . . . +0.08 per cent

The difference between both groups was 0.05 per cent and such a small difference is not significant clinically.

When the mixing water temperature for alginate was varied the following dimensional changes of resultant dies were obtained.

Alginate mixed with 70° F. (21° C.) water .....+0.36 per cent
Alginate mixed with 32° F. (0° C.) water .....+0.32 per cent

The difference between both groups was 0.04 per cent and such a small difference is not significant clinically.

The cooling of alginate impressions from mouth to room temperature affected the dimensional changes of the resultant dies as follows:

Impressed and poured at same room temperature .....+0.09 per cent.
Impressed at 99° F. (37° C.) and poured at 57° F. (14° C.) ...+0.06 per cent.

The alginate molds seem to have shrunk by 0.03 per cent in cooling 40° F. (23° C.). Such a small difference is not significant. It is uncertain, however, whether this difference represented the true dimensional change of free impression material, because the impressions were supported by the tray in a rather complicated relation. Theoretically it is to be expected that the pure alginate will shrink by approximately the coefficient of thermal shrinkage of water, but little change was recognized in this experiment. The causes, although not clear, may have been the support and the restriction of the trays and the ingredients of the alginate. This problem will be studied further in a complementary experiment reported in a later section of this paper.

The humidity during the taking of alginate impressions had little influence on the dimensions of resultant dies, as shown by the following:

Impressed in 100 per cent humidity .....+0.09 per cent
Impressed in 57 per cent humidity .....+0.08 per cent

The difference of 0.01 per cent is not significant. It is supposed that the influence of humidity will be much less in the mouth because most surfaces of the alginate are covered by mouth tissue and tray.

The dimensional difference between the dies made by alginate soaked in 1 per cent zinc sulfate for 30 seconds and the ones poured at once without fixation was not ascertained because of surface roughness of the latter die.

When the water-powder ratio for hydrocal was varied, the following dimensional changes of resultant dies were obtained:

Plastone's water-powder ratio 0.25 .....+0.03 per cent
Plastone's water-powder ratio 0.35.....—0.01 per cent

The more the water mixed with the hydrocal, the smaller was the expansion in alginate impressions.

The humidity at which the poured alginate impressions were kept had little influence on the die dimension, as shown by the following:

Impression kept in 100 per cent humidity after pouring ....+0.09 per cent
Impression kept in 57 per cent humidity after pouring ....+0.06 per cent

The difference of 0.03 per cent is not clinically significant. The fact that the degree of humidity had so little influence depended possibly on the fact that the greatest part of the alginate's surface was covered with die material and tray which resembled conditions in the mouth.

5. Study on distortions of alginate impression

Phillips, Price and Reinking[1] reported that when the alginate impression in a cylindrical tray shrank in drying, the mold in it became larger, and that when it expanded hygroscopically, the mold became smaller. However, the impression trays used in clinics generally have two side walls only, rather than a continuous wall, so the effect may be less.

In this experiment, the directional distortion was studied by measuring the diameters of dies made by a U-formed tray in which the alginate was supported by tray walls in two directions but was open on the two ends. The dimensional changes were caused by keeping the alginate impressions in air or water for 30 minutes after fixation during which time the alginate shrank on drying or expanded hygroscopically, respectively. The dimensional changes of resultant Plastone dies as compared with the original model of the D type were as follows:

Impression kept in air
  +0.50 per cent in supported direction of tray
  ±0 per cent in unsupported direction of tray
Impression kept in water
  −1.03 per cent in supported direction of tray
  +0.75 per cent in unsupported direction of tray

These data show that, when the alginate impression was exposed in air, it expanded in the supported direction and shrank in the unsupported direction of the tray, and that when the alginate impression was kept in water, it shrank in the supported direction and expanded in the unsupported direction of the tray. The combination of expansion and shrinkage at the same time creates distortion.

Therefore, any cause of expansion or shrinkage of alginate impression should be eliminated. Most important, it should be remembered that drying the impression in air and soaking it in water are dangerous. The alginate impression should be soaked in a proper fixing solution for a very short time since time of soaking is related to the amount of distortion.

Studies on Dimensional Change of Dies After Being Completed •

1. Influence of time on the completed dies

A. Changes of hydrocal dies with time

The time-dimension curves of hydrocal dies of model E in Plastone and Duroc are shown in Figure 6. These dies had been poured in alginate impressions.

They expanded for about one day after pouring during which time the setting crystallization of gypsum was continued; then they shrank slowly while drying in air. The amount of change of Plastone dies was greater than that of Duroc dies, though the inclinations of both curves were almost the same.

B. Changes of cement dies with time

The phosphosilicate cement dies of the small plate (B, Fig. 1) continued to shrink as curve 3 in Figure 6 shows.

C. Changes of copper-amalgam dies with time

The copper-amalgam dies (D, Fig. 2) expanded as the curves 4a, b and c show (Fig. 6). No excess mercury was removed from the amalgam of curve 4a, which expanded more at first but less afterward; half the mercury was removed from that of curve 4b, and the maximum amount of mercury was removed from that of curve 4c, which expanded less at first but more afterward.

D. Changes of silver-tin amalgam dies with time

The silver-tin amalgam dies (D, Fig. 2) expanded to +0.44 per cent after

1. Phillips, R. W.; Price, R. R., and Reinking, R. H. Use of alginate for indirect restorations. J.A.D.A. 46:393 April 1953.

four hours, +0.51 per cent after one day, +0.73 per cent after one week and +0.95 per cent after two weeks. This curve is not shown in Figure 6.

2. Influence of separating media on the completed dies

In Japan, three sorts of lubricants—water, glycerin and petrolatum—are used as separating mediums between wax and die materials. The influence of these lubricants on die dimensions was studied by measuring the outside wall distance in these main experiments.

A. General observation regarding dimensional influences of separating media

When three kinds of separating media were used, the outside of specimen dies changed as shown in Figure 7. The curves are the averages of 10 specimens for each group.

As shown in Figure 7, hydrocal dies shrank at first when soaked in water or glycerin and cement dies expanded in water and shrank in glycerin (being supposedly dehydrated). It was not ascertained in this main experiment whether such changes were superficial or whether they extended throughout the specimen. It was later studied in the complementary experiments. These changes seemed to be eliminated to some extent when the dies were dried in air.

Little change was observed when three types of separating media were used on amalgam dies and when petrolatum was used on all types of dies.

B. The influence of the age of hydrocal dies on the dimensional changes caused by soaking in water

The outside wall distances of small plate Plastone dies (B and C, Fig. 1) that

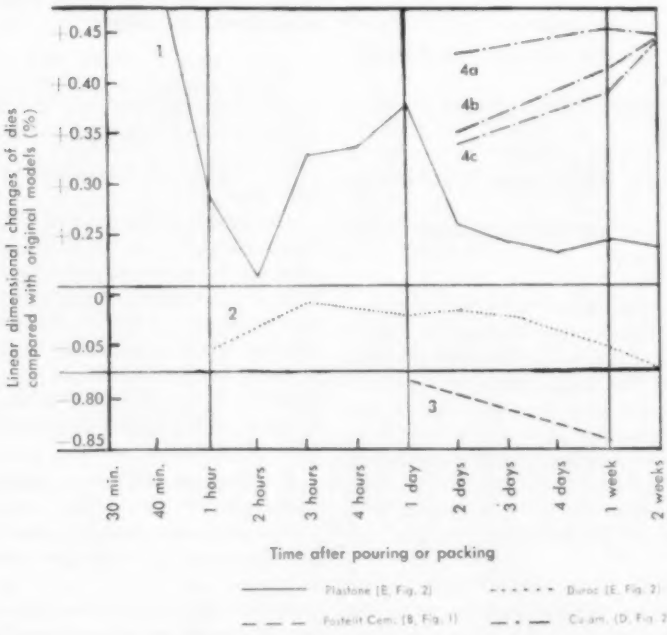

Fig. 6 • Dimensional changes of dies with time

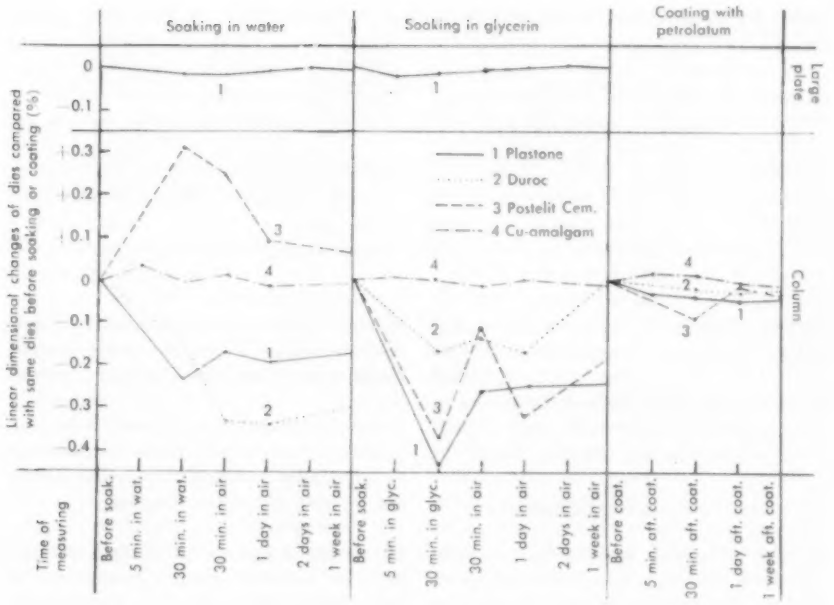

Fig. 7 • Influence of separating mediums on die dimentions

had been soaked at various times for 30 minutes in water were measured. The specimens were divided into three groups: Group 1 was soaked one hour after pouring; Group 2 was soaked after one day, and all three groups were soaked after one week. The results shown in Table 1 give the linear dimensional changes in per cent as compared with their dimensions at one hour after pouring (before soaking).

As is shown in Table 1, the outside wall distances of hydrocal dies one hour old, in which the setting reaction was not finished, expanded when soaked in water. The one day old dies, which had nearly reached the maximum of setting expansion curve, showed the greatest shrinkage on soaking. The one week old dies also shrank, but less than those one day old.

The dies that were soaked again, shrank again. The ones which had expanded hygroscopically at the midway point of setting expanded less on completion of setting and showed the greatest shrinkage on soaking after one week.

C. Changes of hydrocal dies through soaking, according to time of taking out of compound impression

The Plastone dies of the large plate type (A, Fig. 1) were taken out of the compound impressions at various times—groups 1, 2, 3 and 4 were taken out respectively one hour, two hours, one day and two days after pouring. They were soaked in water one week after pouring and measured before and after soaking. The figures in Table 2 indicate the percentage changes of the outside wall distances of the dies as compared with the dimensions of the original models.

As Table 2 shows, the dies that were taken out earlier and that had expanded rather more freely, shrank more in such

Table 1 • Influence of age of Plastone dies (B and C, Fig. 1) on their dimensional changes (%) when soaked in water for 30 minutes

Group	Soaked 1 hour after pouring		Soaked 1 day after pouring		Soaked 1 week after pouring	
	Before soaking	After soaking (change)	Before soaking	After soaking (change)	Before soaking	After soaking (change)
Group 1	±0	+0.05(+0.05)	+0.09	not soaked	+0.01	−0.12(−0.13)
Group 2	±0	not soaked	+0.23	−0.05(−0.28)	−0.04	−0.15(−0.11)
Group 3	±0	not soaked	+0.22	not soaked	+0.18	+0.14(−0.04)

soaking. However, the ones in which setting expansion was suppressed in compound for one or two days, expanded conversely a little on soaking in water after one week. The greatest part of such effect remained until the next day.

COMPLEMENTARY EXPERIMENTS

In the principal experiments already described, five additional subjects were studied. The first project was to measure the outside and inside wall distances comparatively under similar conditions. The second was to study further the influence of the cooling of the alginate on die dimension. The third was to ascertain whether the 1 per cent zinc sulfate fixing solution was proper for alginate. The fourth was to find a way to control the setting expansion of Plastone dies, and the last was to ascertain whether the shrinkage of hydrocal dies caused by soaking in water was superficial or was body shrinkage. These five projects were taken up in these complementary experiments.

An additional experiment was performed to discover changes of hardness in completed hydrocal dies when different separating media were used.

Measuring Apparatus and Method Used in the Complementary Experiments •

1. Basic principles for method of measuring

The measurements of the inside wall distances of the dies made from impressions of H (Fig. 2) in the main experiments could not be relied on, because of the possibility of distortion of those dies. Therefore, the true dimensional changes could not be ascertained by comparison of the outside and inside wall distances. Whether the values of the measured outside wall distance contained some con-

Table 2 • The relation of the time of taking hydrocal dies (A, Fig. 1) out of compound impressions with their soaking changes in water

Group	Time of taking dies out of comp. impress.	Before soaking	After soaking (change)	1 day after drying
1	1 hour after pouring	+0.226	+0.211(−0.015)	+0.208
2	2 hours after pouring	+0.131	+0.125(−0.006)	+0.126
3	1 day after pouring	+0.042	+0.050(+0.008)	+0.052
4	2 days after pouring	−0.023	−0.009(+0.014)	−0.017

Note: The figures without parentheses show the dimensional changes (%) of dies as compared with the original model. The figures in parentheses show the dimensional changes of dies compared with those before soaking.

tacting error of the gauge also was not known, although these values were supposed to be comparatively exact. The author developed another set of gauges for use in the complementary experiments—gauges by which the inside and outside wall distances could be measured comparatively under similar conditions.

2. Structure and uses of the comparative measuring gauges

The comparative measuring equipment consisted of two sets of bronze models and fitting pieces, one for the outside measuring and the other for the inside measuring (Fig. 8).

K in Figure 8 was the original model for measuring the outside wall distance. It is 10 mm. in diameter at the top surface with a taper of 10 per cent (5 per cent on each side). L in Figure 8, the original model used for measuring the inside wall distance, has an internal diameter of 10 mm. at its opening and 10 per cent taper (5 per cent on each side) in the inside wall. K′ and L′ are seated on K and L models respectively so that the top surfaces are even. If the top surface of K′ or L′ was 0.01 mm. higher (or lower) than that of a specimen die when put on it, it meant that the specimen had expanded or shrunk in the case of K and shrunk or expanded in the case of L by 0.001 mm., namely, 0.01 per cent, because of the 10 per cent taper and the 10 mm. diameter.

Small holes were made in the center of these original models so as to prevent the distortion of an alginate impression that is caused by the suction on withdrawing.

This type of measuring equipment is useful only for alginate impressions. Changes of inside wall distances of the dies poured in compound impressions cannot be measured exactly by this method because the compound impressed into the inside of the L model will contract in cooling with accompanying distortion. However, the compound on the outside surface of the K model will shrink together with the bronze model;

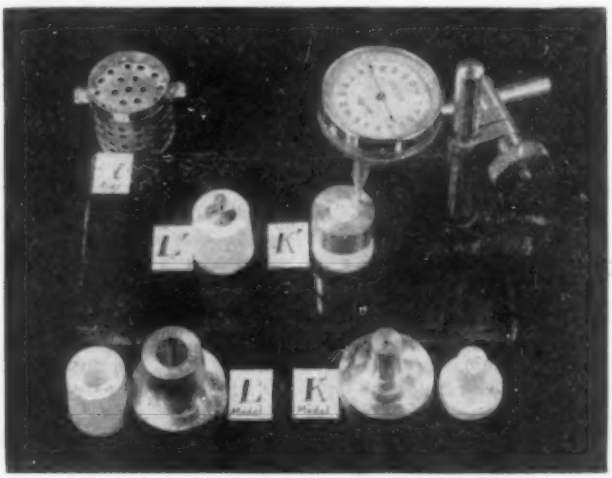

Fig. 8 • Outside and inside wall distances comparative measuring gauges. Original models and specimen dies—K, L. Fitting pieces on specimens—K′, L′. Tray-i. Dial gauge

the amount of shrinkage will be the same as that of the thermal shrinkage of the bronze instead of that of the compound itself.

3. Dial gauge and measuring precision

A dial gauge with an accuracy of 0.01 mm. was used to measure the height of the fitting pieces on the specimens. These dimensional changes could be measured to 0.01 per cent. There were apparently some contacting errors, however, between the dies and the specimens. In order to reduce the contacting error, all unevenness visible to the naked eye such as blowholes on the die surfaces were cut off. The fitting pieces were pressed with finger pressure on the dies to reduce as much as possible the effect of the microscopic roughness of the die surfaces. Even though some contacting errors remained, the approximately true values can be calculated by taking the average of the values of inside and outside walls, because the errors in inside and outside walls are opposite and equivalent. This equipment showed a measuring error of 0 to 0.03 per cent when the same specimen was measured repeatedly.

4. Trays for impression

The i-trays (Fig. 8) were used for the impression of these models.

5. Equipment controlling experimental conditions

The same equipment as that used in the main experiments was used for controlling experimental conditions.

Studies of the Dimensional Changes in Dies •

1. Making the specimens

Technicol was used as the alginate impression material and Plastone and Duroc as hydrocal die materials. The standard conditions and procedures for making the specimens were the same as those in the main experiments in which alginate impressions were used; one was varied if necessary for the purpose of the experiment. The same consideration was given to the thermal dimensional changes of alginate impressions and bronze models as was given in the main experiments. Ten specimens (five of K type and five of L type) were made for each group.

Special technics were needed to prevent distortion when the alginate impressions were taken off the original models (K and L, Fig. 8). To prevent the alginate from penetrating the air hole, a small piece of thin paper was put over the opening on the top surface of K model before taking the impression, and a small metal ring and disk were put over the opening on the cylindrical bottom of the L model. A wet cotton thread was put along the inside and outside walls of the L model, then the alginate was impressed on it and the thread was removed just before withdrawal of the impression, so as to leave a small air space that would reduce the suction of the alginate impression on withdrawing.

2. Test results

The following results were obtained when the comparative measuring gauges were used.

A. The dimensional changes of the alginate hydrocal dies made under standard conditions

The dimensional changes of the alginate-hydrocal dies made under standard conditions are shown in Table 3 and the outside and inside wall distances are compared. The dimensional differences of the dies as compared with the original models are also shown.

With Plastone dies the outside wall distances were larger by 0.09 and 0.28 per cent than the inside wall distances and the outside or inside wall distances were respectively larger or smaller by 0.04 and 0.14 per cent than the averages of both, which may nearly correspond with the contacting errors of such gauges. In practice the wax patterns also contact die walls that have such errors, and it

Table 3 • Dimensional changes of the alginate-hydrocal dies made under standard conditions

Group	Dimensional changes (%) of dies compared with original models			
	Outside wall distance	Inside wall distance	Average of both	Difference between both
Plastone dies (example 1)	+0.35(±0.10)	+0.07(±0.21)	+0.21	0.28
Plastone dies (example 2)	+0.26(±0.07)	+0.07(±0.08)	+0.22	0.19
Duroc dies (example 1)	−0.04(±0.07)	−0.24(±0.08)	−0.14	0.20
Duroc dies (example 2)	−0.01(±0.14)	−0.16(±0.10)	−0.08	0.15

may be a desirable error in the clinic because the inlays made on such dies with slightly larger outside and smaller inside wall distances will fit the original preparation rather more easily; also only a thin space will be left for cement.

The real dimensional changes of hydrocal dies which showed as the averages of the outside and inside measurements were +0.21 and +0.22 per cent for Plastone and −0.14 and −0.08 for Duroc. The reason why Duroc, which expanded slightly in compound, shrank in alginate is obscure.

B. Influence of the thermal dimensional change of alginate impressions on die dimension

In this experiment the influence of cooling of alginate impressions on both outside and inside wall distances of resultant Plastone dies was studied. The temperature at which the impressions were taken was varied. The results are shown in Table 4.

The differences between the groups were small but seemed to show an unexpected tendency. If the alginate shrank in cooling, the outside wall distance of dies should have become larger because the mold wall would be pulled to the tray walls; the inside wall distance should have become smaller because the alginate laid in it would shrink. However, the data obtained here was contrary to this expectation. The reasons for these results were not determined.

C. Influence of concentration of fixing solution

In the main experiment in which small plate models were used, it was recognized that the alginate impressions expanded a little when they were soaked for 30 minutes in 1 per cent zinc sulfate fixing solution; therefore, it may be that the 1 per cent zinc sulfate solution was too dilute. The following experiment was performed to solve this question.

One, 2 and 3 per cent concentrations of the fixing solution for the alginate impressions were used, and the outside and inside wall distances of alginate-Plastone dies were measured (Table 5).

Table 4 • Influence of cooling of alginate impression on the outside and inside wall distances of resultant Plastone dies

Group	Conditions		Dimensional changes of dies compared with original models		
	Temperature of impression	Temperature of pouring	Outside wall distance %	Inside wall distance %	Average of both %
1	73°F. (23°C.)	73°F. (23°C.)	+0.35	+0.07	+0.21
2	97°F. (37°C.)	73°F. (23°C.)	+0.33	+0.19	+0.26

Table 5 • Influence of concentration of fixing solution for alginate on outside and inside wall distances of dies

Fixing water	Outside %	Inside %
1% zinc sulfate	+0.47	+0.06
2% zinc sulfate	+0.40	+0.01
3% zinc sulfate	+0.46	+0.07

Note: Figures show dimensional changes of dies compared with original models.

If the alginate impression expanded hygroscopically when soaked in 1 per cent zinc sulfate solution for 30 seconds, such expansion would be less when the thicker solution was used, so the outside wall distance of the resultant die would become larger and the inside would become smaller. However, these facts were not borne out as shown in Table 5. It can be concluded, therefore, that alginate impressions expanded only slightly when they were soaked in these fixing solutions for as short a time as 30 seconds, and that there was little dimensional difference in the dies when the concentration of the zinc sulfate solution was varied from 1 to 3 per cent.

D. Control of setting expansion of hydrocal dies

When two chemicals were added to the mixing water of Plastone, the setting expansion of alginate-Plastone dies (averages of the inside and outside measurements) was as follows:

Mixed with tap water (control) .....+0.35 per cent
Mixed with 10 per cent Rochelle salt solution .....+0.27 per cent
Mixed with 4 per cent potassium sulfate and 0.6 per cent borax solution .....—0.23 per cent

Thus, the setting expansion of hydrocal dies could be reduced or changed to shrinkage by the addition of chemicals to the mixing water. The procedure is not suitable clinically because the strength of dies would be reduced thereby.

Study of the Influence of Separating Media on Hydrocal Dies •

This experiment was performed to clarify the mechanism of changes in die dimensions caused by soaking. Such changes were observed in the main experiments, but it was not ascertained whether the changes were superficial or occurred throughout the specimen.

Specimens of alginate-Plastone dies were made from models K and L under standard conditions as mentioned.

The alginate-Plastone dies one day old were soaked for 30 minutes in water or glycerin. Their dimensional changes were measured with comparative measuring gauges. The changes were compared with those in the dies which had not been soaked.

The results shown in Figure 9 reveal the following facts.

When the hydrocal dies were soaked in water, their outside wall distances became smaller (curve W_1, Fig. 9) and in the beginning the inside wall distances became larger (curve W_2). It was first suspected that the wearing of die walls by fitting pieces caused these changes; however, such changes were not observed in the dies that were not soaked. Therefore, it is considered more likely that such changes resulted from superficial contraction of the soaked hydrocal dies or possibly solution of the hydrocal in water.

This superficial change seemed to be irreversible. In the main experiment in which only the outside wall distances were measured, it seemed to be reversible as is shown by curve 1 of Figure 7, but this curve which appeared to be reversible had been made by a combination of superficial shrinkage and consequent body expansion that was irreversible. Here again, the surface solution may have caused the effect.

As the curve W_3 in Figure 9 shows,

the body dimension, represented by the average of the outside and inside measurements after expansion from soaking in water, continued to expand for about one day after soaking, and then shrank through dehydration. These dimensional changes have some relation with the solution and recrystallization of gypsum in its crystal grain boundaries and at the gypsum-water interface.

When soaked in glycerin, the outside wall distances of the dies became smaller (curve G_1) and the inside wall distances became larger (curve G_2) but the changes were less than those in dies soaked in water. Internal expansion also was observed for about one day after soaking, but little shrinkage on drying was observed thereafter (curve G_3). However, a slight solution of the gypsum in glycerin would give this effect.

The changes of these two curves W and G were considered to have been made by the soaking in water and glycerin, because curve C of the dies not soaked (control group) showed little change.

1. Studies on influence of separating media on hardness of hydrocal dies

Hydrocal has the least surface hardness of all die materials now in use. It is undesirable for hardness of hydrocal dies to be further reduced. Therefore, the

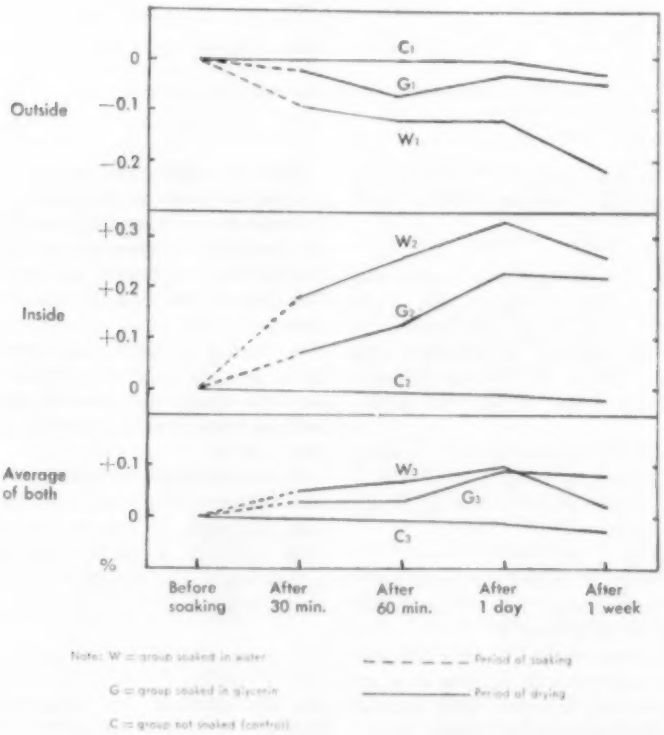

Fig. 9 • Influence of separating media on dimensions of hydrocal dies (K and L, Fig. 8) one day old (dimensional changes in per cent)

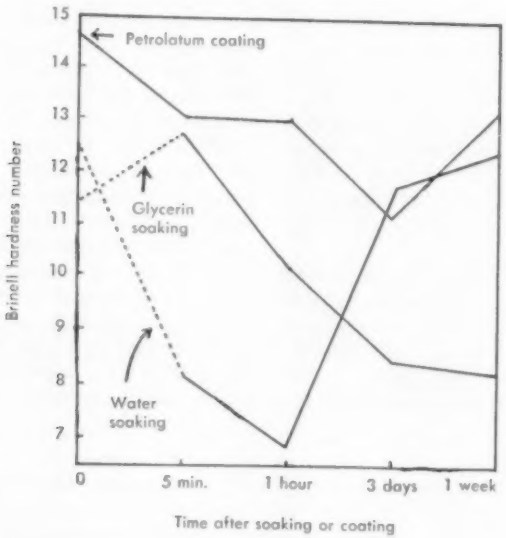

Fig. 10 • Influence of separating media on hardness of hydrocal dies

changes in hardness of Plastone dies through use of separating media were measured.

A. Testing

Plastone dies (L type) two weeks old were used — five specimens for each group. The first group was soaked in water for five minutes, the second group was soaked in glycerin for five minutes, the third group was coated with petrolatum.

The Brinell hardness of their surfaces was determined by using a steel ball 5 mm. in diameter under a load of 10 kg. for 45 seconds.

B. Results

The average of Brinell hardness numbers for each group changed as shown by the curves in Figure 10.

The hardness of the Plastone dies was reduced considerably by soaking in water for five minutes; however, their original hardness was restored by drying in air. This result corresponds to what is usually found.

The dies soaked in glycerin for five minutes seemed to be slightly harder immediately after soaking, but thereafter the hardness became slowly less. This process was progressive and irreversible. The reason for such a change is not clear.

A coating of petrolatum lowered the hardness of hydrocal dies slightly at first, but little change was observed thereafter, perhaps because petrolatum did not penetrate deeply.

When the three curves indicating hardness changes (Fig. 10) are compared with the data on dimensional changes (Fig. 7 and 9) it can be concluded that petrolatum is the best of the three separating media tested.

SUMMARY AND CONCLUSIONS

On the Method and Equipment for Study •

1. A method of comparing the side wall dimensions of tapered dies of prac-

tical size and form with those of original models was developed. This method was found to be more useful clinically than any other method for the study of dimensional changes of the dies for indirect dental technics.

2. The discordance measuring gauges developed by the author and used in the main experiments made it possible to measure the dimensional changes of tapered dies of practical size with clinically valuable precision to 0.01 per cent. The D type model (Fig. 2) was found to be preferable for measuring the standard dimensional changes in the compound impressions, and the E type (Fig. 2) for those in alginate impressions.

3. The comparative measuring gauges originated by the author for measuring outside and inside wall distances were used in the complementary experiments. These gauges made it possible to measure the changes of the outside and inside wall dimensions under similar conditions and to compare them. The figures obtained by this method approximate the clinical value of practical dies at the time of taking wax patterns, and the average shows the true dimensional changes of dies with a clinically useful precision. This type of gauge is not useful for compound impressions.

On the Dimensional and Form Changes of the Dies Made By Compound Impressions • The following results were obtained when tray compound manufactured by G. C. Chemical Co. was used.

1. The flowing error of compound impressions was reduced when the compound was softened with the hottest water possible and well fitting trays were used.

2. The side walls of compound impressions wore 4 microns when the impression was inserted and removed once. More wear was evident when the procedure was repeated.

3. The shrinkage of impression compound caused by cooling from mouth temperature (99°F.) to room temperature made the resultant die smaller by about 0.1 per cent per 10°F. (6°C.).

4. Substantial setting expansion was observed on the Plastone dies which had been taken out of compound impressions early (one or two hours after pouring), but little expansion was noted in the dies that were removed from the compound impressions after one or two days.

5. The standard dimensional changes of dies as compared with the original models were as follows in the compound impressions:

Compound-Plastone (hydrocal) die . . . . . +0.20 per cent
Compound-Duroc (hydrocal) die . . . . . +0.06 per cent
Compound-phosphosilicate cement die . . . . . —0.33 per cent
Compound-zinc phosphate cement die . . . . . —0.57 per cent
Compound-silver-tin amalgam die . . . . . +0.51 per cent
Compound-copper amalgam die . . . . . +0.34 per cent

(Note: Impressed and poured at the same room temperature, measured after one day except the copper amalgam which was measured after two days.)

6. When the water-plaster ratio for Plastone was increased, the expansion of the die was decreased. When the liquid-powder ratio for the cement was increased, the shrinkage of the dies was increased. The more the excess mercury was expressed from the copper-amalgam mix, the less was the expansion of the resultant die.

On the Dimensional and Form Changes of the Dies Made by Alginate Impressions • The following results were obtained when the alginate (Technicol),

manufactured by G. C. Chemical Co., was used:

1. A water-powder ratio of 2.5:1 for the alginate gave the best results. The water-powder ratio of the alginate, the temperature of water mixed with it and the difference between the impressing temperature and the pouring temperature had little influence on the dimensional change of the resultant Plastone die.

2. The most suitable method of fixing the alginate impressions was to soak them for 30 seconds in 1 to 3 per cent zinc sulfate solution. If soaked in 1 per cent zinc sulfate solution for a long time, however, the alginate expanded. Good die surfaces were not obtained without fixing nor were they obtained by soaking in calcium sulfate or potassium sulfate solution.

3. The relative humidity during the impression taking and after pouring had little influence on the dimensions or forms of dies made by alginate impressions. The alginate impressions, however, shrank considerably if dried before pouring, and they expanded if soaked in water.

4. If the alginate impressions, supported unequally by tray walls, shrank or expanded accordingly, the molds in them were distorted, expanding in one direction and shrinking in the other.

5. The standard expansion of dies as compared with the original models were as follows in the alginate impressions.

Alginate-Plastone
die .....+0.09 to 0.55 per cent
Alginate-Duroc
die .....—0.08 to 0.14 per cent

(Note: Impressed and poured at the same room temperature, measured after one day.)

The outside or inside wall distances were respectively larger or smaller by 0.04 and 0.14 per cent than the averages of both.

6. The setting expansion of the Plastone dies was reduced by increasing the water-powder ratio. The expansion was also reduced by using 10 per cent Rochelle salt solution for mixing. When a 4 per cent potassium sulfate and 0.6 per cent borax solution was used, an over-all shrinkage resulted.

On the Dimensional Changes of the Completed Dies • The dimensions of the completed dies changed with time, and separating media also influenced these dimensions.

1. The hydrocal dies continued their setting expansion for about one day after their initial set and then shrank on drying. Differences of more than 0.15 per cent in the curve with Plastone and more than 0.05 per cent in the curve with Duroc were shown.

2. When soaked in water, the hydrocal (Plastone) dies seemed to shrink slightly after final setting, superficially at first, decreasing their outside wall distances and increasing their inside wall distances. Internal expansion, represented by the averages of the outside and inside measurements, was observed during the soaking. This expansion continued for about one day after soaking and then shrank during the drying. This superficial shrinkage may have been due to solution of the gypsum in water.

In the measurements of outside wall distances, the hydrocal dies soaked in water soon after their initial setting expanded. The dies soaked after one day shrank most and the ones soaked after one week shrank slightly. However, those dies whose setting expansions were suppressed by keeping in the compound impressions for more than one day, ex-

panded when soaked in water after one week.

3. When soaked in glycerin, the hydrocal dies at first seemed to shrink superficially after their final setting, but they shrank less than when soaked in water. Internal expansion, represented by the averages of the outside and inside measurements, also was observed for about one day, but little drying shrinkage was observed thereafter.

4. Coating with petrolatum caused little dimensional change in any of the dies.

5. On drying, the phosphosilicate cement dies shrank with time. Their surface expanded when the dies were soaked in water and shrank when soaked in glycerin.

6. The copper amalgam dies generally expanded with time. The more excess mercury that was present, the larger was the die at first; however, the rate of expansion from the second day on varied inversely as the amount of excess mercury present. The dimensional changes of the copper amalgam dies caused by separating media were very small.

7. Silver-tin amalgam dies continued to expand with time showing a dimensional change of +0.44 per cent after four hours and 0.95 per cent after two weeks.

On the Hardness Changes of Hydrocal Dies by Use of Separating Media •

1. The hardness of the Plastone dies was reduced considerably when the dies were soaked in water for five minutes, but they recovered their original hardness when dried in air.

2. The Plastone dies soaked in glycerin for five minutes seemed to increase in hardness slightly just after soaking, but thereafter there was a slow reduction in hardness. The process was progressive and irreversible.

3. Coating with petrolatum lowered the hardness of Plastone dies a little at first, but little change was observed thereafter. Petrolatum seemed the best of the three separating media tested.

Arabic Language • From the second half of the eighth to the end of the eleventh century, Arabic was the scientific, the progressive language of mankind. During that period, anyone wishing to be well informed, up-to-date, had to study Arabic (a large number of non-Arabic speaking people did so), even as now anyone who wants to follow the intellectual advance must begin by mastering one of the great Western languages. ***George Sarton, Introduction to the History of Science.***

Practice administration today and tomorrow

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It is not easy to find a satisfactory definition for the term "practice administration," for the definition will tend to vary with the person applying it. The administration of a dental practice is a highly subjective matter, and there are few areas of agreement among individual practitioners on specific procedures. The term "practice administration" is relatively new in the literature and replaces the more familiar one of "practice management." In my view the terms can be used interchangeably with only a shade of variance in meaning. Some hold, however, that the use of the word "administration" somehow removes the commercial implications that are alleged to adhere to the use of the word "management." This is a fine distinction.

Whether the term "practice administration" or "practice management" is favored, there is need for a definition. One worthy of repetition has been stated by Harold Hillenbrand, secretary of the American Dental Association. In an address to the annual session of the Minnesota State Dental Association in 1952, he gave a definition of practice management as "the orderly arrangement and administration of all of the useful facilities and services needed for a productive, professional dental practice."[1] This is an excellent, over-all definition on which most dentists can agree. The author also agrees with Dr. Hillenbrand that practice management must not involve "the use of every coercive and tawdry device to 'sell' as much dentistry as possible without consideration of the real needs of the patient."[1]

The *Principles of Ethics* of the American Dental Association clearly sets forth the general basis of sound practice administration in the two following sections:

> The dentist's primary duty of serving the public is discharged by giving the highest type of service of which he is capable and by avoiding any conduct which leads to a lowering of esteem of the profession of which he is a member.
>
> The dentist has a right to win for himself those things which give him and his family the ability to take their proper place in the community which he serves, but there is no alternative for the professional man in that he must place first his service to the public rather than gain to himself.

These statements are clear and forthright. They forbid giving anything less than the dentist's best professional service no matter what fee is involved. They forbid using the tactics of a trade in order to increase the remuneration of the dentist.

It is something less than honest for so-called practice management experts to tell dentists that they must never accept cash from a patient because it is more lucrative to get a patient's signature on

Presented before the ninetieth Midwinter Meeting of the Chicago Dental Society, Chicago, February 9, 1955.

1. Hillenbrand, Harold. Practice management and the principles of ethics. North-West Den. 31:59 April 1952.

a contract which involves additional charges because of the use of the installment plan. Such practices are openly and directly in violation of the *Principles of Ethics*. Yet it is not uncommon to find young dentists, particularly, who believe that there must be a "third party" note for financial success in dental practice. This practice is not a part of practice administration; it is the exploitation of a dental practice.

Professional men need not be visionaries, giving their services to improve a hapless world. Professional men must engage in sound administrative practices, and there is no conflict between the successful and rewarding conduct of a dental practice and the *Principles of Ethics*. No dentist can afford to operate his practice at a loss. But, by the same token, no dental practice should be used as a get-rich-quick vehicle at the expense of the patient. The financial side of dental practice need not be discussed at length. The laborer is worthy of his hire: the dentist is entitled to a good living provided he renders his best service to his patients.

IMPACT OF FLUORIDATION

The long-range aspects of the problems of practice management should be considered, to determine what the intelligent dentist can do to conform to the pressures of the present and to anticipate the trends of the future.

Current progress in dental research indicates that there will be major changes from time to time in the demand rate for various dental services. For example, the fluoridation of community water supplies will in time have a major effect on the caries rate and the subsequent need for dental fillings, particularly among children. There can be no serious doubt that fluoridation of community water supplies in the near future will be as common as the chlorination of water supplies is today. As of February 1955, some 20,250,000 persons residing in 1,044 communities are routinely drinking fluoridated water. Responsible agencies of both New York city and Chicago have approved fluoridation, and it is expected that within a year or so this program will be in operation in our first and second cities. Philadelphia already is fluoridating its local water supplies.

With fluoridation, a reduction in the incidence of dental caries of around two-thirds as compared with the present incidence can be expected. Figures from the 1953 annual report of the Grand Rapids Health Department show a reduction in the number of decayed permanent teeth of 71 per cent for six year old children and a 25 per cent reduction in decayed permanent teeth for 16 year old children.[2] This same report noted that 57 per cent of the six year old children had no decay in their first permanent molars, compared with only 17 per cent before fluoridation. From Kingston, New York, from Sheboygan, Wisconsin, from city after city the same general results are being obtained—an average reduction in the incidence of caries of about two-thirds.

The advocacy of the fluoridation of communal water supplies reflects the application of the highest principles of ethics. Time and again the question is raised why the dental profession will so strongly advocate a measure which potentially reduces the incomes of the dental practitioner. The answer is obvious only to the professional man, for the duty of every professional man is to put himself out of business—the dentist to eradicate dental disease, the physician to prevent the diseases which harass humankind and the lawyer to keep his clients out of court. The situation in industry is different. The automobile industry does nothing, and properly so, to prevent the wider use of

2. Grand Rapids reports 71% caries reduction. J. Michigan D. A. 36:278 Dec. 1954.

automobiles. This is the difference between a trade and a profession. Unless this difference is understood and applied in dental practice, the basis for sound practice management or administration will not have been found.

There can be no question that fluoridation will have a noticeable and beneficial effect on dental practice in the future. The dentist will find himself less and less engaged in restorative services and more and more concerned with preventive services. There are those who will view this development with alarm. A review, however, of the great public health movements of the past is reassuring. Some members of the medical profession opposed such measures as vaccination and chlorination. They believed that once the endemic and epidemic diseases were diminished by such preventive measures, the practice of medicine would diminish economically. Exactly the opposite has happened. The nation and the world today see an unmatched demand for medical services in spite of the host of preventive measures which have been developed.

TREND TOWARD PREVENTIVE DENTISTRY

It was not too many years ago that the young medical specialty of pediatrics was sneered at as a cult of "baby doctors." Today, the pediatricians have a firm standing not only in the civic community but in the medical profession. They practice preventive medicine almost wholly, and they have been, and are, the solace of millions of mothers the world over. A similar development is quite probable in the practice of dentistry, and it may be that fluoridation will have a large part to play in bringing it about.

Dentists today often give the diagnosis without charge in order to secure the more remunerative restorative work. Patients properly educated to the value of dental health will eagerly pay more for preventive service than they will for restorative service. This change in dental practice challenges both the ingenuity and the ethics of the dental practitioner. Consideration must be given to providing preventive services on a yearly or monthly fee basis. A portion of the public is ready for such a service; it remains only for the members of the dental profession to work out an acceptable, practicable and equitable program.

The American public does not need to be taught the basic lesson of the value of prevention, but it does need to be taught to apply it to dentistry. The automobile driver who pays a little more for power brakes is paying a little more for prevention. The homeowner who fireproofs the walls of his house is utilizing the principles of prevention. And so the story goes. Prevention is a part of American life because in this country many people have enough income and foresight to look beyond the immediate, driving needs of the day. It remains for the dental profession, and more importantly for the individual dentist in his private practice, to teach his patients the value of preventive services. If this is done, the fluoridation of communal water supplies becomes a reinforcement of the basic truth that health is best achieved by the prevention of diseases.

The trend toward prevention is not limited to fluoridation. When every communal water supply in the nation is fluoridated, there still will be some 50 or more millions of persons living in rural areas, not serviced by a common water supply, not receiving the benefits of this health procedure. Such matters as brushing the teeth immediately after meals, the reduction in the consumption of sugar and other fermentable carbohydrates, are procedures equally available to all segments of the population. It is significant that the per capita consumption of candy and confectionery products dropped between 2 and 3 per cent from 1951 to 1952 and by a similar percentage from 1952

to 1953. To what extent this decrease can be attributed to dental health education programs is not certain, but there is a definite relationship.

The day may come, although it seems distant at the moment, when there actually may be a therapeutic dentifrice. A truly therapeutic dentifrice would, of course, have a very significant impact on dental practice.

Research will in time find the answer to caries and some of the other more common dental diseases. That does not mean, however, that the dentist will be unoccupied. On the contrary he will have the knowledge and the skill to do an even better job of providing a more efficient health service for more and more patients.

DENTISTRY FOR OLDER PERSONS

Another general area which must be considered very carefully is that which the late John O'Rourke called "geriodontics." Certainly practice administration cannot be discussed today without consideration of the vastly increased number of older persons in need of dental services. In 1940, only 6.8 per cent of the population was 65 years of age or older, compared to 8.4 per cent in 1954 and an estimated 10 per cent in 1955. To say it another way: In 1940, there were nine million persons over age 64; a projection of population figures indicates there will be 20.7 million persons over 64 years of age by 1975.

No longer can professional men pat grandmother or grandfather on the shoulder and tell them that they are in as good dental health as they might expect at their ages. Older people today, just as those of the younger generations, expect and demand dental services of the highest standard. It is becoming increasingly common to provide new dentures for persons of 65, 70 and even 75 years of age. In former years this was comparatively rare.

A question which the professional man must consider is the matter of fees for services provided older patients. Most of them no longer are gainfully employed. They are living on their savings and, increasingly, throughout the nation, on pensions. Most of these pensions are small. The limited income of the great majority of older persons, however, in no way diminishes their need for health services. Nor does it in any way eliminate the moral obligation of society to see that these people have access to the health services they need. It is not the responsibility of the health professions to assume the full burden of providing health services for any segment of the population. Rather the obligation is that of all society. As professional men and as citizens, dentists have a definite responsibility to provide the necessary leadership in their own communities to see that these older patients are not neglected.

If the patient and his dentist have cooperated over the years in a sound program of prevention and treatment, the patient will reach the older age levels without facing a catastrophic and costly dental problem. It is, therefore, sound practice administration for the dentist to convince his patient that an expenditure for preventive and treatment services over the years is an investment in his dental future which will provide substantial dividends in both health and savings in the later years of life. This type of program should be deeply embedded in any dentist's management of his practice.

IMPACT OF FASTER OPERATING PROCEDURES

Another factor which will have a considerable effect on dental practice in the future involves the current and predicted improvements in operating procedures. Today it is possible to accomplish restorations in much less time than it was a few years ago. One of the important factors making this possible is the almost total elimination of pain in operative procedures. Large restorations no longer

necessitate long hours of work. Many difficult cutting procedures can be completed in a third or a fourth of the time previously required. The ultrasonic device, the high-speed turbine drill, carbide tungsten burs—these and many similar devices promise speedier and more efficient operative procedures.

These devices, as they are perfected and generally accepted, will have a major impact on dental practice. Some patients may expect to pay less for treatments completed in a fraction of the time formerly required. The dentist, too, may wish to equate in some degree his time to the size of his fee. Certainly this whole matter is one that will be of particular relevance in practice administration of the future.

The effect on the patient of faster operating procedures must also be considered. It is bold, to say the least, to criticize the routine use of local anesthetics, but a word of caution must be expressed. It is not a wise procedure to anesthetize a quadrant of the mouth to prepare many cavities in the shortest period of time without consideration of the effect of anesthesia on the patient. There are offices in which the practitioner picks up the syringe almost before he knows what he actually is going to do. This procedure of producing the greatest number of fillings in the shortest period of time is not necessarily good dentistry. Too often, such procedures fall in the same category as does the "third party" note.

In some instances, local anesthetics are used today more to increase the charge for services than they are for the comfort of the patient. No professional man could ever have any quarrel with the proper use of modern anesthetics. Neither dentistry nor medicine as they are practiced today could exist without modern anesthesia. To use it primarily for the welfare of the practitioner rather than the patient, however, is a serious violation of professional ethics. All the technics, drugs and procedures used in dental practice must be geared to provide a productive health service within the full meaning of professional standards.

EFFECT OF SOCIAL PROGRAMS ON DENTAL PRACTICE

In addition to the factors here discussed, there are many social developments and trends which are having an increasing effect on the health professions. One is the development of health service programs by labor groups. This trend is not new. For years, medicine has been involved in an increasing number of welfare programs worked out between labor unions and employers. Many of these programs were developed during World War II when industry agreed to establish special funds for medical, surgical and hospital services for employees as so-called "fringe" benefits. In practically every major city in the nation, programs such as these are in operation in varying degrees.

Only recently have such programs been expanded to include dental care. Several attempts have been made to work out an efficient and effective program for the provision of dental care to large groups of workers. None, however, has reached the point where it can be accepted as a model suitable for use throughout the country. Rather, these programs are still in a state of development. No one can forecast accurately the exact pattern that these programs will follow. The one thing which is certain is that there are going to be more and more of these programs in the future.

During the past year, labor unions on the west coast have made plans for dental service programs, some of them in cooperation with the state dental societies and some without such cooperation. Some of these programs are based on an open panel; that is, a panel on which all members of a district or state dental society may be eligible to participate. Other

programs are based on a closed panel which is limited to a single group of dentists.

A test of these programs is now being made under the joint supervision of the California State Dental Association, the International Longshoremen's and Warehousemen's Union and the Pacific Maritime Association. The plan provides that a sum of $750,000, which was a surplus in the union's health and welfare fund, be used to finance a pilot dental treatment program for the care of children of union members over a one year period. Through discussions with the state dental association, two types of programs were established. One program is based on a closed panel with a group of dentists working under a direct contract with the trustees of the union welfare fund. The other is an indemnification program with an open panel. Under the latter program, all members of the state dental association may participate. Care will be limited to $75 per child per year in accordance with a fee schedule worked out between the union welfare trustees and representatives of the dental profession. In both Oregon and Washington similar programs are being developed by representatives of union and professional groups.

No one knows what the ultimate impact of these programs will be. Certainly they will involve many considerations of practice management. Group practice is often advocated by labor union groups as a major approach to the solution of some health problems. If there should be an increasing tendency to move in this direction, the operation and conduct of a group practice on sound, ethical principles will provide a great challenge to the field of practice management. There will be a need to modernize the concept of a dental office as one having a dentist and one or two auxiliary persons. There may be four or five dentists and many more auxiliary persons. This will require greater coordination of all types of procedures if the group practice is to progress smoothly. More people will have to learn, and be taught, to work together as a team in the interest of the patient.

Those interested in practice administration would do well to confront this trend with a soundly based philosophy and a carefully developed program of operation. If this is done, it may be that group practice will reveal some new technics in providing dental health services to more people.

Another result of the trend toward labor union programs will be stronger efforts to negotiate lower fees for large group programs. While it may be true that mass production of automobiles lowers the cost of the individual unit, it is not true of dental care. Practice management, therefore, must work toward the collection of data in the individual practice to justify the fees charged. There should be careful evaluations of time, overhead, work load distribution and the many other factors which contribute to an efficient dental practice.

Only in this way can the dentist and the dental profession meet with facts the inevitable challenge to reduce fees merely because a group is used to buying on a mass basis. Dental care can never be mass-produced, and practice management should be prepared to prove that it cannot.

The union-sponsored programs are symptomatic of the continuing search for an equitable means of making health care available to greater numbers of people. In New York City the profession is testing a plan known as "Group Dental Health Insurance." Sponsored by the First District Dental Society, this program is designed to bring dental health services at reduced fees to low income families. Whether this will work satisfactorily is a moot question. Many are strongly opposed to the program, and others are supporting it militantly.

These, then, are some of the trends which will have an effect on dental practice. It will not do to wish for the good

old days when a dentist could practice as he wished, oblivious to any social pressures for better dental health programs. Those days simply are not coming back. As the complexity of society increases, so, too, will the complexity of dental practice. This is as it should be.

HOW THE DENTIST CAN ADAPT TO A CHANGING SOCIETY

The dentist interested in sound practice administration will first determine his own place in the scheme of things. He will study the directions of social and professional changes. He will have some basis of establishing himself on the principles of sound practice management, learned—it is hoped—in his dental school days. He will absorb the good ideas that are available to him through the dental literature and the literature in the field of administration and management.

He will have decided long ago to manage his practice in conformance with both the letter and the spirit of the *Principles of Ethics*. He will be familiar with sound business practices without turning his profession into a business. He will detect the unprofessional approach of many of the so-called practice management plans.

He will analyze his own dental practice carefully from the viewpoint of the service he is rendering to his patients and from the viewpoint of the rewards he hopes to win for himself and his family. He will teach himself to experiment with various procedures so that he may improve both his efficiency and the quality of service he renders his patients. He will take advantage of sound refresher courses in practice management.

If a dentist does all—or most—of these things, he need have no fear of coming social changes, for he will be in the sound position always of being able to render a valuable service for an equitable fee. He will have built soundly on a program that recognizes the present and anticipates the future. Such a program of study and analysis by all dentists of the United States would have a tremendously wholesome impact on the rendering of dental health care.

215 West Water Street

An Ethical Deception • The physician (or dentist) who gives the patient a prescription for "blank" pills to help him overcome imaginary ills is using an accepted therapeutic device. Known as a placebo, the blank cartridge is a form of suggestion. Depending on the art with which it is presented, it can reduce pain, induce sleep, relieve anxiety and increase appetite. Placebos also are helpful in situations where the patient has long been taking a conglomerate assortment of drugs which have confused the pathologic symptoms. Physicians and dentists can stop the drugs, and instead prescribe a placebo to satisfy the patient until the tests are completed and the diagnosis can be made. Placebos also are useful in severe instances (cancer) where there is no hope after all known treatment is tried. Rather than permit the patient to think he has been abandoned, the administration of placebos may be continued. *B. D. Senturia, "Administration of Placebos: An Ethical Deception," Science Digest 19:51 Oct. 1955.*

Deductible entertainment expenses of professional men

Myron Goldenberg, C.P.A., Chicago

Ordinarily, expenditures for entertainment and gifts are social and personal expenses, deduction of which from taxable income is prohibited by the Internal Revenue Code. If an expenditure is to be considered deductible, the burden is on the taxpayer to establish that it has a direct relationship to the conduct of his business or profession and that business benefit is reasonably to be expected from the payment.

Following are two cases in which the court disallowed deductions claimed for entertainment expenses. Although in both instances the decisions involved medical practitioners, they might readily apply to members of the dental profession.

DISALLOWED DEDUCTIONS

Example A—The Tax Court disallowed a deduction for entertainment expenses by a surgeon because no record had been kept of the persons entertained and there was no proof of the business benefit derived from such expenditures. The court held that the burden of proof was not met "by the vague statement that the petitioner hoped to derive some business as a result of the expenditure." The petitioner also deducted sums expended as a consequence of the position of his wife as president of a medical society auxiliary. The court did not consider such expenditures as ordinary and necessary expenses of the doctor's practice.

The court further held that the expenses he incurred in promoting horse shows with a view to raising funds for a hospital and a school as not sufficiently related to his medical practice as to constitute ordinary and necessary business expenses. His expenditures for wedding presents were also denied because he "did not state amounts he expended on wedding presents . . . the number of such gifts or the names of recipients, nor show any instances in which his services as physician or obstetrician were sought by such persons." Apparently, the court would have been ready to allow a deduction for wedding presents if the doctor had been able to produce records indicating the names of the recipients together with the amounts spent, supported by evidence that on some occasions he treated such persons as patients. It would appear that a professional man must be able to produce some evidence of business benefit before entertainment expenses will be allowed as a deduction.

Example B—Dr. "B" operated an industrial clinic. His clients were the commercial and industrial organizations that employed his patients and the insurance companies that insured such organizations. He did not secure patients by referrals from other doctors and patients, nor did his private practice involve any substantial number of patients who con-

Prepared for, and presented through the courtesy of, the Exchange National Bank of Chicago.

sulted him of their own volition. The doctor claimed the following items as business deductions:

1. The cost of flowers sent to nurses' groups, hospitals, and Christmas parties and of candy and tickets to the Police Relief Association benefit given to telephone operators, elevator operators, secretaries, and parking lot attendants.
2. The cost of a hunting trip.
3. Gifts to medical associates.
4. The cost of printing copies of an article written by him concerning industrial surgery.
5. The cost of his own meals in attending numerous luncheons of the chamber of commerce and the hospital council.
6. The cost of entertaining other physicians and their wives and of entertaining persons connected with commercial organizations and insurance companies who were in a position to enhance his practice as an industrial doctor.
7. The cost of maintenance and depreciation of a cabin cruiser.

The court allowed 25 per cent of the amounts claimed under items 6 and 7 as expenditures for entertainment and for cruiser expense and depreciation as ordinary and necessary expenses of "trade or business." All the other items were disallowed.

Fundamentally, the court interpreted the evidence as establishing the fact that the deductions taken by the doctor were primarily living costs, expended for the pleasure of his family and himself.

He had made no effort to segregate from his entertainment expenses the portion that was for the benefit of his family and himself and therefore essentially personal in nature. Since his entertainment expenses included both personal and business entertainment, the court made its own determination as to which portion should be allocated as business expenses. Possibly, if the doctor had made an effort to segregate in his records the business portion of these expenses, the court might have been willing to accept his own determinations rather than arbitrarily make its own allocations.

COMMENT

Cases "A" and "B" point up the need for keeping not only detailed records of business entertainment expenses that the professional man intends to deduct from his gross income but also supporting explanations showing the business relationships in connection with each individual item claimed. Bank records are the best. A good practice is to maintain a separate checking account for professional practice. All business expenses should be paid by checks drawn on this account. Of course, there are some expenses that it is inconvenient to pay by check. In such instances, a check may be drawn to the maker, indicating on the stub or check the purpose for which the check is made. If a substantial amount of business entertainment is necessary in the professional man's practice, it is desirable to use charge accounts. A notation may be made on the statements as they are received for payment, indicating the names of the persons entertained.

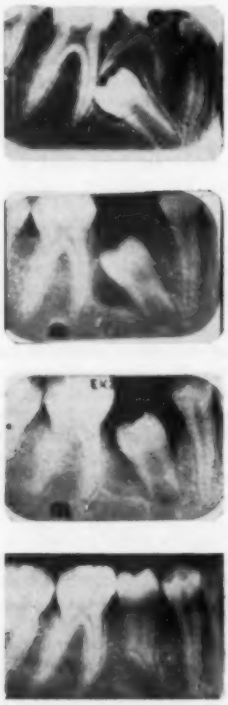
It is then essential that the professional man be able to establish that his professional income was influenced by the persons entertained.

53 West Jackson Boulevard

SURGICAL REALIGNMENT OF MALPOSED TOOTH

By Morton Thaler, D.D.S., Flushing, N. Y.

A girl of 11 had a badly decayed deciduous lower second molar and a permanent bicuspid horizontally impacted beneath it (illustration, first photograph). As the bicuspid was still in its embryonal sac with the root only partially formed, surgical realignment was felt to be the most feasible manner of bringing it into proper position.



First photograph: Horizontally impacted bicuspid beneath decayed deciduous molar. Second photograph: Tooth turned upright after removal of molar and layer of cortical bone. Third photograph: Tooth two months after operation. Fourth photograph: Two years after operation

Under block anesthesia the deciduous molar was extracted, and a layer of very hard cortical bone above the bicuspid was removed by means of a chisel and surgical bur. Enough space was created so that the tooth could be turned upright with as little displacement of the apex as possible (illustration, second photograph). Penicillin cones were inserted; healing was uneventful.

Two months later the tooth had maintained its proper position and was erupting (illustration, third photograph). Two years later the tooth was vital and in proper alignment. The apical portion of the root shows a distorted formation, caused, most likely, by the disturbance to its formative organs (illustration, fourth photograph). This report demonstrates how a tooth in seemingly hopeless position may be restored to function.

137-03 Northern Boulevard

IMPROVED TECHNIC FOR PLASTER IMPRESSIONS

By Jerome S. Mittelman, D.D.S., New York.

Plaster impressions serve exceptionally well in several phases of crown and bridge prosthesis. Since it permits definite seating of crowns or copings, has minimum change in dimension and offers relatively little pressure in the taking of impressions of edentulous regions, plaster is invaluable. Nevertheless, the use of plaster presents problems. Undercuts and unyielding irregularities in those parts of the mouth not being treated, but included in the impression, often require time consuming procedures. Often it is necessary to fracture the plaster impression in order to remove it from the mouth and to reassemble it before a model can be poured.

In those many instances when only a few teeth have been prepared, the number of unaffected teeth with their undercuts becomes larger, and hence the difficulties increase. When the transfer technics are employed, particularly the double casting coping technic, the full mouth plaster impression has been the preferred method.

A technic is needed that preserves the required characteristics of plaster as concerns

the abutments and yet affords ease of manipulation with no sacrifice of accuracy. A combination of plaster and the new rubber base impression paste yields satisfactory results in many instances. The technic is simple; plaster is used over the abutments and edentulous regions, rubber base paste over the remaining teeth.

After the copings, transfers, or crowns are seated and a tray is selected, the region corresponding to the several abutments is marked on the tray. Small drippings of low fusing modeling compound are melted onto the tray in this particular section. These drippings lock into the plaster so that when the tray is removed, the plaster and copings come with the tray. Compound may be dotted throughout to engage the rubber as well.

Impression plaster and rubber base impression material can be regulated to set with approximately equal speed. While the operator mixes one, his assistant prepares the other. A small amount of plaster is placed in the mouth over the abutments and edentulous region or, in the case of simple splinting, over the abutments alone. The corresponding region of the tray is loaded carefully with plaster, and the rest is filled with the rubber base impression material. The tray is then inserted in the mouth for setting. The plaster, because it engages no undercuts, removes with the tray and fracturing and reassembling are unnecessary.

The model when poured into this impression is more easily handled by the technician; the impression requires no special treatment such as waxing pieces together or keeping in humid condition, as is necessary in some other technics.

In addition to being kinder to the patient with no compromise in result, the operator saves time and strain. This technic is easily mastered.

30 East 60th Street

PENICILLIN REACTION IN ENDODONTIC TREATMENT

By Gunter Schmidt, D.D.S., St. Louis.

A white man, aged 39, seen October 30, 1954, reported discomfort in the lower right first bicuspid. Roentgenograms showed a radiolucent area around the apical region of this tooth. The canal was opened and reamed and found to be dry. A polyantibiotic paste (penicillin-dihydrostreptomycin-bacitracin paste) was sealed into the canal.

On November 2, the cotton point which had been sealed in at the previous treatment was removed, and a polyantibiotic paste was again injected under slight pressure. A cotton point was placed in the canal. There was immediate severe pain below the tooth, extending along the bone towards the right ear. The pain was followed within four hours by progressive edema and cellulitis, which at its maximum was sufficient to obliterate the angle of the jaw and required several doses of codeine for relief. The patient was placed on erythromycin (Ilotycin) 250 mg. four times a day and hot saline washes hourly.

By November 10, the edema had subsided moderately, but the region around the first and second bicuspid was still hard and indurated. The root canal was opened and left open after the cotton point had been removed.

On January 20, 1955, the opened canal was cleaned with hydrogen peroxide, dried, and a dressing of polyantibiotic paste was again sealed in with a cotton point.

Four hours later the patient reported pain, a hard indurated region around the bicuspid and cellulitis. The cellulitis was less than on the first occasion. Pruritus and edema of the palms were noted, urticarial wheals along the face and neck, and an erythema nodosum of the scalp and face. The patient was given 50 mg. of diphenhydramine hydrochloride (Benadryl) intramuscularly and three doses orally as well; the allergic symptoms subsided within 24 hours and the edema within 48 hours.

On January 28, metacresyl acetate (Cresatin) was sealed into the canal with only minimal reaction. On February 1, a silver point root canal filling was placed uneventfully.

This patient has a previous history of allergy to seasonal pollens (rhinitis) and to certain nuts but no specific history relative to penicillin.

The case history seems to indicate a sensitivity in the patient to penicillin or one of the other ingredients of polyantibiotic paste. The literature reports few instances of sensitivity to the small amount of antibiotics introduced into the body by endodontic procedures.

This experience indicates, however, that it is wise for the dentist to inquire about such sensitivity and not to use antibiotics in people who are sensitive to those drugs.

990 Arcade Building

JUDICIAL COUNCIL

Revised Principles of Ethics of the American Dental Association

At the ninety-sixth annual session of the Association held in San Francisco October 17 to 20, 1955, the House of Delegates adopted a revised *Principles of Ethics*. The text of the new instrument represents the combined thoughts of the Judicial Council, the officers, members of the Board of Trustees and others especially interested in improving the ethical standards of the profession. In addition to being published here, a copy of the revised principles has been mailed to each member of the Association as a guide for professional conduct.

PRINCIPLES OF ETHICS

The practice of dentistry first achieved the stature of a profession in the United States where, through the heritage bestowed by the efforts of many generations of dentists, it acquired the three unfailing characteristics of a profession: education beyond the usual level, the primary duty of service to the public and the right to self-government.

The maintenance and enrichment of this heritage of professional status place on everyone who practices dentistry an obligation which should be willingly accepted and willingly fulfilled. This obligation cannot be reduced to a changeless series of urgings and prohibitions for, while the basic obligation is constant, its fulfillment may vary with the changing needs of a society composed of the human beings that a profession is dedicated to serve. The spirit and not the letter of the obligation, therefore, must be the guide of conduct for the professional man. In its essence, this obligation has been summarized for all time and for all men in the golden rule which asks only that "whatsoever ye would that men should do to you, do ye even so to them."

The following statements constitute the *Principles of Ethics* of the American Dental Association. The constituent and component societies are urged to adopt additional provisions or interpretations not in conflict with these *Principles of Ethics* which would enable them to serve more faithfully the traditions, customs and desires of the members of these societies.

Section 1. Education Beyond the Usual Level • The right of a dentist to professional status rests in the knowledge, skill and experience with which he serves his patients and society. Every dentist has the obligation of keeping his knowledge and skill freshened by continuing education through all of his professional life.

Section 2. Service to the Public • The dentist has a right to win for himself those things which give him and his fam-

ily the ability to take their proper place in the community which he serves, but there is no alternative for the professional man in that he must place first his service to the public.

The dentist's primary duty of serving the public is discharged by giving the highest type of service of which he is capable and by avoiding any conduct which leads to a lowering of esteem of the profession of which he is a member.

Section 3. Government of a Profession • Every profession receives from society the right to regulate itself, to determine and judge its own members. Such regulation is achieved largely through the influence of the professional societies, and every dentist has the dual obligation of making himself a part of a professional society and of observing its rules of ethics.

Section 4. Leadership • The dentist has the obligation of providing freely of his skills, knowledge and experience to society in those fields in which his qualifications entitle him to speak with professional competence. The dentist should be a leader in his community, especially in all efforts leading to the improvement of the dental health of the public.

Section 5. Emergency Service • The dentist has an obligation when consulted in an emergency by the patient of another dentist to attend to the conditions leading to the emergency and to refer the patient to his regular dentist who should be informed of the conditions found and treated.

Section 6. Use of Auxiliary Personnel • The dentist has an obligation to protect the health of his patient by not delegating to a person less qualified any service or operation which requires the professional competence of a dentist. The dentist has a further obligation of prescribing and supervising the work of all auxiliary personnel in the interests of rendering the best service to the patient.

Section 7. Consultation • The dentist has the obligation of seeking consultation whenever the welfare of the patient will be safeguarded or advanced by having recourse to those who have special skills, knowledge and experience. A consultant will hold the details of a consultation in confidence and will not undertake treatment without the consent of the attending practitioner.

Section 8. Unjust Criticism and Expert Testimony • The dentist has the obligation of not referring disparagingly to the services of another dentist in the presence of a patient. A lack of knowledge of conditions under which the services were afforded may lead to unjust criticism and to a lessening of the patient's confidence in the dental profession. If there is indisputable evidence of faulty treatment, the welfare of the patient demands that corrective treatment be instituted at once and in such a way as to avoid reflection on the previous dentist or on the dental profession. The dentist also has the obligation of cooperating with appropriate public officials on request by providing expert testimony.

Section 9. Rebates and Split Fees • The dentist may not accept or tender "rebates" or "split fees."

Section 10. Secret Agents and Exclusive Methods • The dentist has an obligation not to prescribe, dispense or promote the use of drugs or other agents whose complete formulae are not available to the dental profession. He also has the obligation not to prescribe or dispense, except for limited investigative purposes, any therapeutic agent, the value of which is not supported by scientific evidence. The dentist has the further obligation of not holding out as exclusive, any agent, method or technic.

Section 11. Patents and Copyrights • The dentist has the obligation of making the fruits of his discoveries and labors available to all when they are useful in safeguarding or promoting the health of the public. Patents and copyrights may be secured by a dentist provided that they and the remuneration derived from them are not used to restrict research, practice or the benefits of the patented or copyrighted material.

Section 12. Advertising • Advertising reflects adversely on the dentist who employs it and lowers the public esteem of the dental profession. The dentist has the obligation of advancing his reputation for fidelity, judgment and skill solely through his professional services to his patients and to society. The use of advertising in any form to solicit patients is inconsistent with this obligation.

Section 13. Cards, Letterheads and Announcements • A dentist may properly utilize professional cards, announcement cards, recall notices to patients of record and letterheads when the style and text are consistent with the dignity of the profession and with the custom of other dentists in the community.

Announcement cards may be sent when there is a change in location or an alteration in the character of practice, but only to other dentists, to members of other health professions and to patients of record.

Section 14. Office Door Lettering and Signs • A dentist may properly utilize office door lettering and signs provided that their style and text are consistent with the dignity of the profession and with the custom of other dentists in the community.

Section 15. Use of Professional Titles and Degrees • A dentist may use the titles or degrees, Doctor, Dentist, D.D.S. or D.M.D., in connection with his name on cards, letterheads, office door signs and announcements, but may not so use his title or degree in connection with the promotion of any drug, agent, instrument or appliance.

The use of eponyms in connection with drugs, agents, instruments or appliances is generally to be discouraged.

Section 16. Use of the Terms "Clinic" and "Group Practice" • Unless the use of the term "clinic" has long been established by the custom of dentists in a community as applicable to a dental practice, it is strongly recommended that the term "clinic" be limited to designate public or quasi-public institutions established on a not-for-profit basis for the purpose of providing dental health care.

The use of the term "group practice," in accordance with the following definition, is recommended as applicable to a dental practice and as an alternative to the term "clinic" when its use is consistent with existing statutes and the custom of the dentists in the community:

> Group practice is that type of dental practice in which ethical, licensed dentists, sometimes in association with members of other health professions, agree formally between themselves on certain central arrangements designed to advance the economical and efficient conduct of a dental practice in order to render an improved health service to the patient.

Section 17. Contract Practice • A dentist may enter into an agreement with individuals and organizations to provide dental health care provided that the agreement does not permit or compel practices which are in violation of these *Principles of Ethics.*

Section 18. Specialization and Limitation of Practice • A dentist has the obli-

gation of not holding himself out as a specialist unless he has met requirements of additional experience and education consistent with the standards of dental practice in the community. A dentist may announce himself as a specialist only in one of the specialties approved by the American Dental Association. A dentist may, however, announce the limitation of his practice consistent with the custom of the dentists of the community.

Section 19. Directories • A dentist may permit the listing of his name in a directory provided that all dentists in similar circumstances have access to a similar listing and provided that such listing is consistent in style and text with the custom of the dentists in the community.

Section 20. Health Education of the Public • A dentist may properly participate in a program of health education of the public involving such media as the press, radio, television and lecture, provided that such programs are in keeping with the dignity of the profession and the custom of the dental profession of the community.

Section 21. Judicial Procedure • Problems involving questions of ethics should be solved at the local level within the broad boundaries established in these *Principles of Ethics* and within the interpretation of the code of ethics of the component society. If a satisfactory decision cannot be reached, the question should be referred, on appeal, to the constituent society, the Judicial Council of the American Dental Association and the House of Delegates of the American Dental Association, as provided in Chapter I, Sections 40G, H and I of the *Bylaws* of the American Dental Association.

BUREAU OF LIBRARY AND INDEXING SERVICE

Additions to the Library

The books listed here have been added recently to the Library collection. Requests for this material, available on loan to all members of the Association, should be addressed to the Bureau of Library and Indexing Service. There is no charge for borrowing these books. Most of the books may be purchased also through the Library.

BOOKS

AMERICAN DENTAL ASSISTANTS ASSOCIATION. History of the ADAA, 1925-54. Dayton, Ohio, The Association, 1954. 29 p. Mimeo.

AMERICAN DENTAL ASSOCIATION. Clinical testing of dental caries preventives; report of a conference to develop uniform standards and procedures in clinical studies, by Council on Dental Therapeutics, Council on Dental Research, Council on Dental Health. Chicago, The Association, 1955. 67 p.

AMERICAN DENTAL ASSOCIATION. COUNCIL ON DENTAL HEALTH. Group dental health care programs. Chicago, The Association, 1955. 98 p.

AMERICAN DENTAL ASSOCIATION. COUNCIL ON JOURNALISM. Rates and data, state dental journals. Chicago, The Association, 1955. 38 p.

AMERICAN SOCIETY OF ANESTHESIOLOGISTS, INC. Anesthesiology handbook. Chicago, The Association, 1955. 64 p.

BAKWIN, HARRY & BAKWIN, RUTH. Clinical management of behavior disorders in children. Philadelphia, Saunders, 1953. 495 p. $10.

BERGER, ULRICH. Mikrobiologie der Mundhohle für Zahnärzte und Studenten.

Munich, Urban & Schwarzenberg. 1955. 266 p.

BRANDETSAS, JAMES. The dental educator. Palmyra, N. Y., The Author, 1955. 49 p. $1.50.

CALIFORNIA STATE DENTAL ASSOCIATION. Dentistry's future with fringe benefits and prepayment plans for dental care. San Francisco, The Association, 1955. 16 p.

COELHO, D. H. & REISER, J. M. A complete fixed bridge procedure. New York, New York Univ., 1955. 140 p. $5.50.

DAVIS, D. J. History of medical practice in Illinois. Vol. 2: 1850-1900. Chicago, Illinois State Medical Society, 1955. 530 p. $8.

FINCH, MATTHEW. Dentist in the chair. London, Dennis Dobson, 1955. 160 p. $2.35.

FISCHER, GUIDO. Biologie der Pulpa des menschlichen Zahnes. Leipzig, Barth, 1955. 141 p.

GUTWIRTH, S. W. How to free yourself from nervous tension; an exact, scientific method for relaxing body and mind. Chicago, Regnery, 1955. 200 p. $3.95.

HILTEBRANDT, CARL. Die Gestaltung der totalen Prothese. Konstanz, Zahnärztliche Welt, 1954. 71 p.

JOHNSON, A. L. Dentistry as I see it today. Boston, Little, Brown, 1955. 54 p. $1.25.

KARLSTRÖM, SAM. The pontostructor method for the construction of fixed bridges, crowns and inlays. Stockholm, Nordiska Bokhandelns, 1955. 266 p.

KIRK, P. H. & STERNBERG, E. D. Doctors' offices and clinics, medical and dental. New York, Reinhold, 1955. 218 p. $12.

MISCHOL, E. Infektion und Antiseptik in der Stomatologie. Bern, Hans Huber, 1955. 168 p.

MOKROHISKY, P. A. Chris Cuspid. Binghamton, N. Y., 1955. 34 p. $2.75.

NATIONAL BUREAU OF STANDARDS. Development of methods for evaluation of rotating dental diamond abrasive instruments. Washington, Govt. Print. Off., 1955. 21 p.

NATIONAL BUREAU OF STANDARDS. A method for measuring the mucosal surface contours of impressions, casts and dentures. Washington, Govt. Print. Off., 1955. 20 p.

NATIONAL BUREAU OF STANDARDS. Preliminary investigation of color in dental resins. Washington, Govt. Print. Off., 1955. 16 p.

NATIONAL BUREAU OF STANDARDS. Relationship between residual monomer and some properties of self-curing dental resins. Washington, Govt. Print. Off., 1955. 10 p.

NATIONAL BUREAU OF STANDARDS. Sulfinic acid derivatives as accelerators in the polymerization of methyl methacrylate. Washington, Govt. Print. Off., 1955. 15 p.

POSTELL, W. D. Applied medical bibliography for students. Springfield, Ill., Thomas, 1955. 142 p. $4.50.

ROSS, D. E. Salivary gland tumors. Springfield, Ill., Thomas, 1955. 86 p. $7.50.

STRUNK, F. R., comp. An inventory of economic and social research in health. New York, Health Information Foundation, 1955. 266 p.

U. S. ARMY. MEDICAL DEPT. United States Army dental service in World War II, by George F. Jeffcott. Washington, Govt. Print. Off., 1955. 362 p. $3.25.

U. S. DEPT. OF DEFENSE. Medicine in national defense. Washington, Govt. Print. Off., 1955. 54 p.

VASIL'EV, M. E.; GROZOVSKII, A. L.; IL'INA-MARKOSIAN, L. V. Zuboproteznaia tekhnika. Moscow, Medgiz, 1951. 447 p. $2.50.

WAYNE, J. M. Indexing with emphasis on its technique; an annotated bibliography, 1939-1954. New York, Special Libraries Assn., 1955. 16 p.

WIDDOWSON, E. M. & MCCANCE, R. A. Studies on the nutritive value of bread and on the effect of variations in the extraction rate of flour on the growth of undernourished children. London, H. M. Stationery Office, 1954. 127 p. $1.53.

WILLIAMSON, PAUL. Office procedures [for the physician]. Philadelphia, Saunders, 1955. 412 p. $12.50.

The American Dental Association Film Library

The following films are available from the Film Library at a nominal rental fee of $2.50 to dental societies, study clubs, dental schools, hospital dental staffs, and armed services dental personnel. Since the number of prints of each title is necessarily limited, it is suggested that program chairmen plan their programs far enough in advance to insure availability.

The films, "Operating Room Technique under General Anesthesia," and "Gold Cast Crown with Gold Matrix," which were produced by the Bureau of Audio-Visual Instruction of the State University of Iowa College of Dentistry, appeared on the 1955 annual session motion picture program in San Francisco. Although they were produced primarily for use in teaching, the technics demonstrated should be of interest to the dental practitioner. The film, "Venepuncture in General Practice," a British film, has not been shown in this country in its present revised form. Dental students and dental practitioners, not familiar with the technics involved in the administration of an intravenous anesthetic, will find it instructional. This applies to hospital dental staffs and armed services dental personnel.

FILM REVIEWS

Operating Room Technique under General Anesthesia • 16 mm., color, sound, 13 minutes. Produced in 1955 by the State University of Iowa College of Dentistry, Iowa City. Photography by the Bureau of Audio-Visual Instruction. The film can be purchased from the producer for $110.

The routine sterilizing procedures practiced by the dentist in a hospital operating room are illustrated in this film. The operating room and operating nurse are shown, the sterilizing room with autoclaves and the scrubbing room. While the dentist changes from street clothes to hospital garb the narrator explains the steps involved in the dentist's preparation for the operating room. The film concludes by showing the management of the seven year old patient who is to have a giant cell tumor removed. Although the operation is not shown in detail, the postoperative procedures followed by the dentist in the operating room are shown as well as postoperative photographs.

The film is well organized and suitable for dental students and dental practitioners who may not be familiar with hospital setups.

Gold Cast Crown with Gold Matrix (Direct Method) • 16 mm., color, sound, 23 minutes. Produced in 1955 by the State University of Iowa College of Dentistry, Iowa City. Photography by the Bureau of Audio-Visual Instruction. The film can be purchased from the producer for $250.

The preparation of a molar tooth for a gold cast crown is shown on models and drawings and later in a patient. Five models illustrate the five stages of preparation. Preoperative roentgenograms of the patient are taken from which study models are made. The preparation of the gold matrix, the wax pattern for the crown and the cementing of the crown to the matrix are shown. The film concludes by showing postoperative roentgenograms of the gold crown in position in the patient's mouth.

This film is well organized and photographed. It is suitable for dental students and dental practitioners. Dental societies may find it interesting program material.

Venepuncture in General Practice • 16 mm., color, sound, 18 minutes. Produced in 1954 by S. L. Drummond-Jackson, D.D.S., and H. Mandiwall, D.D.S., England. Photography is by H. Mandiwall. For purchase arrangements write to the producers at 53 Wimpole St., London W.1, England.

The purpose of this film according to its producers "is to show how venepuncture can be practiced in safety, without risk of perivenous infiltration, arterial injection, or other local complications. . . . The film is for those with little previous experience with this method."

The film describes the essentials of simple equipment and reasons for its use. Some of the more common errors in procedures are illustrated and attempts are made to assist the beginner to avoid them. The correct and the incorrect methods of handling as well as the cleaning of needles and syringes are demonstrated.

This film is well organized. The use of close-ups, the stress on incorrect practices and methods to avoid them, increase the instructive value of the film. It is suitable for dental students and dental practitioners and will make stimulating program material for dental societies.

COUNCIL ON DENTAL EDUCATION

Dental and dental hygiene students: their characteristics, finances and practice plans
III. Total expenditures of dental students

The average amount spent by dental students to meet all school and living expenses during the 1953-54 academic year was $2,954. This figure represents a simple average of the expenditures reported by all dental students participating in the survey and includes the living expenses of dependents as well as of the students themselves.

EXPENDITURES FOR THE SCHOOL YEAR

The amount spent during the school year varied greatly from student to student. About one half of the students spent more, and the remainder less than $2,790 (Table 13 and Fig. 7). This median value (Q_2) is $164 less than the arithmetic average because of the tendency for the scores representing students with higher-than-average expenditures to scatter over a broad range of values. One-fourth of all students spent more than $3,483 ($Q_3$) during the year, with the top 1 per cent reporting amounts in excess of $6,000. At the other extreme, one fourth of the students spent less than $2,263 ($Q_1$), with about 1 per cent reporting expenditures of less than $1,250.

Of the expenditures reported, nearly 40 per cent, or $1,119 per student, was devoted to meeting the various items of school expense. Students were instructed to enter as "School Expenses" amounts spent for tuition and fees, textbooks, instruments, equipment and supplies, fraternity or organization dues, and other closely associated expenses. Amounts entered under this category were to include cash outlays by the student plus monies paid directly to the school on his behalf from scholarships and loan funds or by the federal government under the G. I. Bill. Full values were to be reported for fees which were fully or partially waived. The balance was consumed in meeting living costs while attending school. Sums paid for rent, food, clothing, personal maintenance, recreation and entertainment, cigarettes and tobacco, health and medical expenses, travel and for other living items were separately enumerated under "Living Expenses." "Living Expenses," as reported, included all cash outlays and the cash equivalent of all payments in kind. A student who was married, or otherwise maintained dependent relatives in his own household, reported expenditures for all members of the household. On the other hand, the instructions stipulated that a student living with parents, other relatives, or friends, who provided, without charge, part or all of any of the listed items, was to enter amounts corresponding only to his own cash outlays for such items. Average living costs for the school year, generally reported as a 10-month period, were $1,835.

The limited role which school expenses play in determining the level of total expenditures is revealed by data presented in Table 14 and Figure 8. It can be seen that school costs increased only moderately as total expenditures increased over a wide range of values. The highest average school expenses reported were

This is Chapter 3 of a report of a cooperative study made by the Council on Dental Education of the American Dental Association and the Division of Dental Resources of the United States Public Health Service.

Text of this report was prepared by Walter J. Pelton, D.D.S., M.S.P.H., Quentin M. Smith, D.D.S.; Elliott H. Pennell; Ruth D. Bothwell, and James N. Ake, Washington, D. C.

Table 13 • Distribution of dental students by total expenditures for the school year 1953-54

Total expenditures	Students reporting specified amounts	
	Number	Per cent
All amounts	9,521	100.0
$500-749	1	0.0
750-999	13	0.1
1,000-1,249	81	0.9
1,250-1,499	205	2.2
1,500-1,749	366	3.8
1,750-1,999	725	7.6
2,000-2,249	931	9.8
2,250-2,499	1,137	12.0
2,500-2,749	1,136	11.9
2,750-2,999	1,024	10.8
3,000-3,249	853	9.0
3,250-3,499	718	7.5
3,500-3,749	566	6.0
3,750-3,999	458	4.8
4,000-4,249	333	3.5
4,250-4,499	269	2.8
4,500-4,749	194	2.0
4,750-4,999	147	1.5
5,000-5,249	107	1.1
5,250-5,499	70	0.7
5,500-5,749	54	0.6
5,750-5,999	37	0.4
6,000 and over	96	1.0
Summary values		
Arithmetic average	$2,954	
1st Quartile (Q_1)	2,263	
Median (Q_2)	2,790	
3rd Quartile (Q_3)	3,483	

only one fourth greater than the value reported by the lowest reporting group.

In contrast to school expenses, living costs increased more than six-fold between the group of students reporting the lowest average total expenditures and that reporting the highest. In fact, the amount of increase in living expenses reported at each higher level of total expenditure largely determined the amount of increase in the total. Among students spending less than $2,000 during the school year, total expenditures averaged $1,695, of which $728, or less than one half, was concerned with items of living expense. At the other extreme, total expenditures reported by students who spent $5,000 or more per year averaged $5,818; however, of that amount, $4,591, or nearly 80 per cent, was expended to meet living costs.

Marital Status and Living Arrangements • The amount spent during the school year was closely related to marital status and type of living arrangements. Single students living at home (including those living with parents, other relatives, or friends) spent an average of only $2,101 to meet both their school expenses for the year and such "out-of-pocket" living expenses as they were able to estimate. One half of this group reported expenditures between $1,674 ($Q_1$) and $2,451 ($Q_3$), and the remainder reported expenditures which were above or below the extremes of this interquartile range (Table 15 and Fig. 9). The relatively low expenditures reported by many of these students reflect patterns of living where large economies were realized by living at home.

Single students living away from home (including those in dormitories, rooming and boarding houses, clubs and fraternities, rented apartments, and so on) spent nearly $500 more during the school year than did those who were living at home. The average for these students was $2,589. One quarter of the group spent less than $2,185 ($Q_1$) and one quarter reported amounts of $2,910 ($Q_3$) or more. It is believed that the expenditures reported by this group of single students reflect essentially the total cost of all

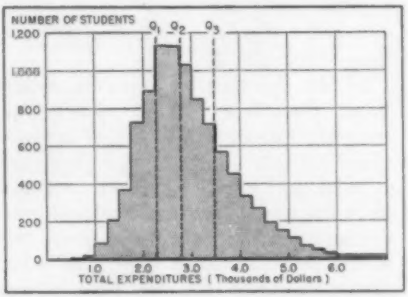


Fig. 7 • Distribution of dental students, by total expenditures: 1953-1954

Table 14 • Average school and living expenses of dental students reporting different total expenditures: 1953-54

Total expenditures	Number of students	Expenditures per student		
		Total	School	Living
			Amount	
All amounts	9,521	$2,954	$1,119	$1,835
$5,000 and over	364	5,818	1,227	4,591
4,000 to 4,999	943	4,409	1,207	3,202
3,000 to 3,999	2,595	3,429	1,165	2,264
2,000 to 2,999	4,228	2,504	1,111	1,393
Less than 2,000	1,391	1,695	967	728
			Per cent	
All amounts	9,521	100.0	37.9	62.1
$5,000 and over	364	100.0	21.1	78.9
4,000 to 4,999	943	100.0	27.4	72.6
3,000 to 3,999	2,595	100.0	34.0	66.0
2,000 to 2,999	4,228	100.0	44.4	55.6
Less than 2,000	1,391	100.0	57.1	42.9

items of school and living expense and that their average more nearly typifies the full cost incurred by single students while attending dental school than would be reflected by an average for all single students.

Expenditures reported by married students were at a much higher level than were those which characterized either group of single students. The average total cost for the school year was $3,602. About one fourth reported expenditures which totaled less than $2,936 ($Q_1$), and one fourth reported amounts in excess of $4,135 ($Q_3$). Living arrangements for students in this group varied over a broad range. In some instances, expenditures were presumably minimized through economies which accrued from living with parents. In the vast majority of instances, however, married students maintained independent households in houses or apartments which they either owned or rented; and, in many instances, students reported expenditures which included the costs of furnishing a home as well as all living costs for the student and his dependents. The dependents that were listed by about one half of all married students included one or more children.

School Differences • The limited part which school expenses play in determining the level of total expenditures was discussed earlier in this chapter. Review of data for individual schools reveals a tendency for student living costs in schools with relatively high "school expense" averages to exceed those reported from schools with low school costs. In Figure 10, averages are presented for schools with high, intermediate and low school costs, grouped on the basis of reports received from students in attendance. The bars reflect average "living expenses" reported by two categories of students.

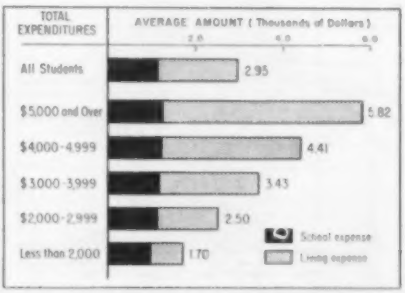


Fig. 8 • Average expenditures of dental students reporting different levels of expenditures: 1953-1954

Table 15 • Summary values describing student distributions by total expenditure for selected categories of dental students: 1953-54

Category of student	Number of students	Total expenditures			
		Arithmetic average	Quartile values		
			First (Q_1)	Second (median) (Q_2)	Third (Q_3)
All students	9,521	$2,954	$2,263	$2,790	$3,483
Married students	4,165	3,602	2,936	3,477	4,135
Single students—away from home	3,825	2,589	2,185	2,524	2,910
Single students—at home	1,531	2,101	1,674	2,017	2,451

The comparison is limited to data for 35 schools whose participation included students in all four school years and excludes data for single students living at home, since this group had little or no representation in several schools and accounted for less than 10 per cent of the total enrollment in nearly one half of the schools. Single students, in attendance where "school expenses" were highest, reported average living costs of $1,490, in contrast with living costs of $1,410 reported from schools with the lowest level of school expense, a difference of only $80 for the year. Similarly, for married students, the difference between the two averages was only $110. These differences, though small, suggest that changes in student living costs are associated with school cost differences in an additive way. In other words, the total expenditures of students in schools with high—as compared with low—school costs are not only expanded by these differences in school costs but also by some slight increase in student living expense.

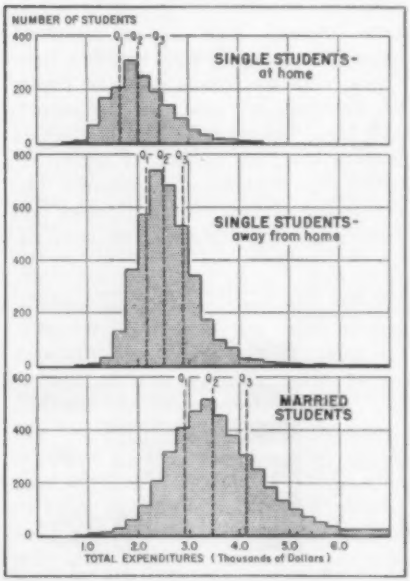


Fig. 9 • Distribution of dental students in selected categories, by total expenditures: 1953-1954

Inspection of basic data for individual schools indicates that the relationship presented for broad groupings of schools does not permit particularization to individual schools. The relationship between school and living costs varied greatly from school to school. The general lack of consistency is revealed when schools are arrayed in order of average school costs. High and low living cost averages for both single and married students are found scattered throughout the array of schools. Public schools, with their relatively low tuition charges, tended to concentrate among schools having low reported school costs. For

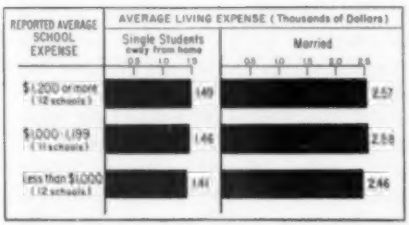


Fig. 10 • Average living expense reported by single and married dental students in schools with different reported average school costs: 1953-1954

some of these schools, reported average living costs were also very low. On the other hand, data from some of the public schools indicated costs of living for students which were among the highest reported.

Trend in Student Expenditures • Comparison of findings from this study with those published by Leuck[3] for the school year 1931-32 indicates that substantial changes have taken place in student expenditures over the past two decades. The earlier study was conducted by the Committee on the Study of Dental Practice of the American Dental Association as a contribution to the work of the Committee on the Costs of Medical Care. Material for that study was obtained directly from students in dental school through the use of expense books which provided daily records of personal expenses throughout the year. Returns were received from 925 of the 3,146 students registered in 14 schools which responded in the study.

The items of information reported were essentially the same for both studies. Living expense items were limited to a school year of 8 or 9 months in the 1931-32 survey, whereas student reports in the current survey generally included living expenses for a ten month period. Relatively few of the students were married in the earlier year, and these married students made returns only for themselves rather than for their families. Approximately 15 per cent of the participating students were living at home.

In order to make data from the current survey more comparable with that obtained in the earlier study, distributions of single students by total expenditures were weighted to reflect the same proportions of students living away from and at home as characterized the returns for the 1931-32 study. The resulting adjusted distribution is contrasted with that reported by Leuck for 1931-32 in Figure 11. The elevated level of current expendi-

3. Leuck, Miriam Simons. A study of the cost of dental education. J.A.D.A. 19:2161 Dec. 1932.

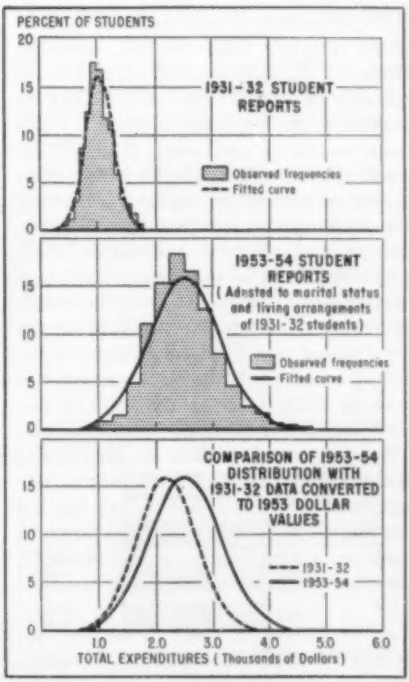

PERCENT OF STUDENTS
1931-32 STUDENT REPORTS
Observed frequencies
Fitted curve
1953-54 STUDENT REPORTS
(Adjusted to marital status and living arrangements of 1931-32 students)
Observed frequencies
Fitted curve
COMPARISON OF 1953-54 DISTRIBUTION WITH 1931-32 DATA CONVERTED TO 1953 DOLLAR VALUES
1931-32
1953-54
TOTAL EXPENDITURES (Thousands of Dollars)

Fig. 11 • Distribution of dental students by total expenditures: 1931-32 and 1953-1954

Table 16 • Average school and living expenses of dental students, by year in school: 1953-54

Year in school	Number of students	Expenditures per student		
		Total	School	Living
			Amount	
Freshman	2,371	$2,730	$1,160	$1,570
Sophomore	2,393	3,024	1,320	1,704
Junior	2,470	3,009	1,103	1,906
Senior	2,287	3,051	882	2,169
4-year total		11,814	4,465	7,349
			Per cent	
Freshman	2,371	100.0	42.5	57.5
Sophomore	2,393	100.0	43.7	56.3
Junior	2,470	100.0	36.7	63.3
Senior	2,287	100.0	28.9	71.1
4-year total		100.0	37.8	62.2

tures is clearly evident from the data. The average annual expenditure in 1953-54 was $2,520, as contrasted with only $1,040 in 1931-32. Conversion of the 1931-32 data to reflect expenditures in terms of 1953 dollar values, however, raises the 1931-32 average to $2,200, an amount which is 87 per cent of that reported by the adjusted average for students in the current study. This adjustment, which relates findings for both studies to a common dollar base, brings about changes in the frequency distribution of students from the earlier study which indicates a very high degree of overlapping of reported values. Inasmuch as living expenses in the earlier study are for a school year of slightly shorter duration, it seems likely that little change has actually taken place in the level of student expenditures aside from that attributable to the decline in purchasing power of the dollar. This is particularly significant when it is noted that, for the population as a whole, personal expenditures per capita have increased about 70 per cent over this same period.

Year in School • The expenditures reported showed considerable variation from one class in school to another. Total expenditures were lowest in the freshman year with an average of $2,730 (Table 16). In the sophomore year, the amount increased to $3,024, and the amounts spent by juniors and seniors deviated but slightly from this latter figure. This pattern of class differences results from summations of school and living costs which follow quite different patterns. School costs for the average student increased from $1,160 to $1,320 between the freshman and sophomore years and then declined by $200 or more for each year thereafter. Living expenses, on the other hand, increased progressively during the four years in school. The average reported by freshmen was $1,570. To this amount, $134 was added in the sophomore year, another $202 in the junior year, and $263 in the senior year. As a result of these changes, the relative importance of the two components of total expenditures changed over the four years in school. For the first two years, school expenses represented more than 40 per cent of all expenditures; in the junior year they represented but 37 per cent of the total; and in the senior year they dwindled to less than 30 per cent of the total.

Interpretation of differences between classes must be tempered with an appreciation of the changes which were taking place in the composition of the student body at the time of the survey. As indicated in Chapter 2, a sharp decline was underway in veteran enrollment, with a concomitant trend to fewer married students and a decline in average age at graduation. The timing of the survey coincides with some intermediate point in this transition, with the result that veterans in the student body of most schools are particularly concentrated in the senior class. For this senior year, veterans comprise nearly 60 per cent of all students. Each succeeding class showed progressively smaller proportions of veterans until, in the freshman year, only one student in four was a veteran. The fact that veterans are older and more likely to be married results in some eleva-

tion in the proportion married, and the varying proportions of veterans in the several classes tends to exaggerate the tendency for the proportion of married students to increase from the freshman to the senior year.

FOUR-YEAR EXPENDITURES

Because of the extensive detail involved in presenting data for each year in school, the averages which have been prepared to compare reported expenditures for students with different characteristics have been summarized as four-year totals. These summary figures represent simple summations of individual annual cost estimates for freshman, sophomore, junior, and senior students. While the level of expenditures, especially those pertaining to living costs, varies considerably for students in different classifications, the patterns of expenditures by year in school are essentially the same for each group of students and parallel closely those previously discussed for all students. In nearly every group, for example, total expenditures increased between the freshman and sophomore years and generally declined each year thereafter. A similar pattern prevailed for average school costs, but differences from year to year were somewhat greater. Finally, living costs, though reported at markedly different levels by some groups as compared with others, showed progressive increases over the four years. In other words, average expenditures varied from one category of students to another, but the trend over the four years in school was similar regardless of the level of expenditures characterizing the group.

Summarization of the estimates for each class in school indicates that the average student spent $11,814 to meet the four-year cost of his education (Table 16). Of this amount, $4,465 was consumed by the various school expense items, and $7,349 was used to meet living costs while attending dental school.

Marital Status and Living Arrangements • The differences in student expenditures associated with marital status and living arrangements are summarized for four years in Figure 12. For the average married student, the total cost of four years in dental school was $14,452. This amount is $4,111 greater than the corresponding total for single students living away from home and $6,157 more than the amount spent by single students living at home. The data presented in Table 17 suggest that these differences between categories of students are evenly spread over the four years in school and arise largely from differences in living expenses. Living costs for married students averaged $10,042. Single students living away from home reported living costs which were only 59 per cent of those for married students ($5,913), while for single students living at home the corresponding average ($3,598) was only 36 per cent of that amount. These same proportionate relationships closely approximate the pattern for each class in school.

Reported average four-year school expenses for each of the three categories of students deviated but slightly from the $4,465 average previously noted for all students in school. There was also very close agreement in the year-by-year school costs for all three groups. The only ap-

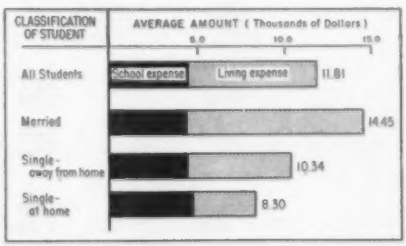


Fig. 12 • Average four-year expenditures reported by selected categories of students: 1953-1954

Table 17 • Average school and living expenses of selected categories of dental students, by year in school: 1953-54

Category of student	Number of students	Expenditures per student		
		Total	School	Living
Married students				
Freshman	718	$3,536	$1,142	$2,394
Sophomore	875	3,781	1,302	2,479
Junior	1,154	3,645	1,093	2,552
Senior	1,418	3,490	873	2,617
4-year total		14,452	4,410	10,042
Single students—away from home				
Freshman	1,232	2,494	1,151	1,343
Sophomore	1,059	2,723	1,309	1,414
Junior	901	2,623	1,079	1,544
Senior	633	2,501	889	1,612
4-year total		10,341	4,428	5,913
Single students—at home				
Freshman	421	2,044	1,215	829
Sophomore	459	2,278	1,382	896
Junior	415	2,079	1,182	897
Senior	236	1,894	918	976
4-year total		8,295	4,697	3,598

parent difference was for single students living at home. For this group, the four-year total was $232 greater than the average for all students, and this difference was distributed over the four years in a uniform way.

Public and Private Schools • Students attending private schools spent nearly $800 (or about 7 per cent) more in the course of four years in school than did those attending public schools. The average four-year expenditure of a private school student was $12,037, as compared with $11,262 for the student attending a public school (Table 18, Fig. 13). This difference represents the balance between school costs which were $1,100 greater

Table 18 • Average four-year expenditures reported by selected categories of students, by type of school: 1953-54

Category of student and type of school	Number of students	Expenditures per student		
		Total	School	Living
All students				
Private	6,777	$12,037	$4,780	$7,257
Public	2,744	11,262	3,682	7,580
Married				
Private	2,771	14,923	4,761	10,162
Public	1,394	13,510	3,712	9,798
Single—away from home				
Private	2,680	10,814	4,754	6,060
Public	1,145	9,237	3,660	5,577
Single—at home				
Private	1,326	8,426	4,862	3,564
Public	205	7,448	3,633	3,815

for students in private schools and living costs which were $300 less.

Actually, the amount of difference in the expenditures of public and private school students is minimized in this comparison. Average total expenditures reported by married students in private schools, for example, exceed those of the same student category in public schools by more than $1,400. Similarly, the differences for single students were approximately $1,000 and $1,500, respectively, according to whether they were living at home or away from home. The relatively closer agreement of averages for all students combined reflects the fact that the average for private schools encompasses reports from proportionately more single students living at home.

For each of the three categories of students, school expenses of those attending private schools were substantially greater than were those in public schools ranging from $1,049 higher for married students to $1,229 higher for single students living at home. Living costs, however, differed by considerably less and, for single students living at home, were actually $251 lower for those attending private schools. The average cost reported by married students was $364 more in private schools than in public schools; and for single students living away from home, the average was $483 greater.

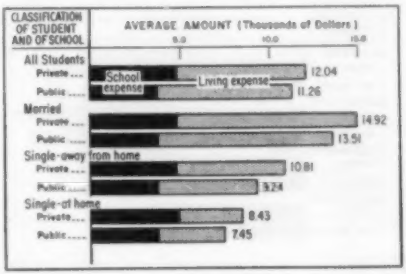


Fig. 13 • Four-year expenditures of selected categories of students, by type of school attended: 1953-1954

Veterans' Status • Veterans reported expenditures which were approximately $2,500 larger, on the average, than were the amounts spent by nonveterans for four years in school ($13,435 as compared with $10,914) (Table 19 and Fig. 14). This difference reflects, in part, the somewhat higher level of living costs reported by veterans in each marital status and living arrangement category. Its extreme magnitude, however, illustrates the distortion which results from computations

Table 19 • Average four-year expenditures reported by selected categories of students, by veteran status: 1953-54

Category of student and veteran status	Number of students	Expenditures per student		
		Total	School	Living
All students				
Veteran	3,564	$13,435	$4,439	$8,996
Nonveteran	5,957	10,914	4,472	6,442
Married				
Veteran	2,508	14,875	4,406	10,469
Nonveteran	1,657	13,858	4,409	9,449
Single— away from home				
Veteran	799	10,588	4,457	6,131
Nonveteran	3,026	10,261	4,416	5,845
Single— at home				
Veteran	257	8,817	4,690	4,127
Nonveteran	1,774	8,195	4,700	3,495

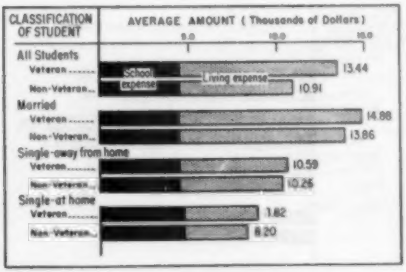


Fig. 14 • Four-year expenditures of selected categories of students, by veteran status: 1953-1954

based on student counts that include different representation from high and low living cost students. Married students, reporting an average expenditure of $14,875, made up nearly two thirds of the veteran total. Among nonveterans, on the other hand, only one fourth were married and their reporting average was $13,858. Similarly, only 7 per cent of all veterans but 21 per cent of all nonveterans were single and living at home. As a result, the "all student" totals reflect average differences which are far in excess of the veteran-nonveteran differences for any of the three categories of students.

The greatest difference between veterans and nonveterans for any of the three categories was $1,017 for the married-student group. Among single students living away from home, veterans' expenditures exceeded nonveterans' by only $327 ($10,588 as compared with $10,261) and for those living at home by about $622 ($8,817 as compared with $8,195). Inasmuch as school expenses for veterans and nonveterans were essentially the same for each category of student, these differences reflect additional expenditures by veterans to meet living costs.

Although the presence of children in the household of a married student might seem to impose additional items of expense, living costs of students with children were not appreciably greater than were those with none. Married veterans with children in the household reported living expenses which averaged $10,610, as compared with $10,272 for married veterans with no children. Similarly, nonveterans reported essentially the same total expenditures whether or not children were present in the household, although in each case the averages were lower for nonveterans than for veterans.

Regional Differences • Distinct contrasts are found when average expenditures for students attending dental schools in one region are compared with those reported from other areas of the country (Table 20 and Fig. 15). Total expenditures for four years in school were lowest in the Northeast ($11,384) and highest in the West ($13,321). The divergence between these average four-year totals is nearly $2,000 or about $500 per year in school. In the South, student expenditures were about $700 greater than in the Northeast, but nearly $1,300 less than the high in the West. In the North Central states, the four-year total closely approximates the low value reported in the Northeast.

The school and living components of these figures show different geographic patterns. School costs were highest in the Northeast and in the West ($5,113 and $4,842, respectively). In the North Central region and in the South, school expenses totaled only $4,122 and $4,241, respectively. As in total expenditures, extremes in living costs were represented by the Northeast and the West ($6,271

Table 20 • Average four-year expenditures reported by dental students, by region: 1953-54

Geographic location of school	Number of students	Expenditures per student		
		Total	School	Living
Northeast	2,271	$11,384	$5,113	$6,271
North Central	3,408	11,515	4,122	7,393
South	2,936	12,042	4,241	7,801
West	906	13,321	4,842	8,479

and $8,479, respectively), with the North Central and Southern regions again reporting intermediate values ($7,393 and $7,801, respectively).

The differences noted reflect a variety of influences. To some extent, particularly in respect to school costs, reported values are influenced by the extent to which students in public and in private schools are represented among survey participants. Average living cost values, of course, are influenced by differences in the extent to which married and single students, at home or away from home, are represented in the participating groups. Inspection of more detailed tabulations suggests that regional differences in living costs are somewhat exaggerated by the inclusion of proportionately more married students and fewer single students living at home in the data for the West and the South than for the other two regions.

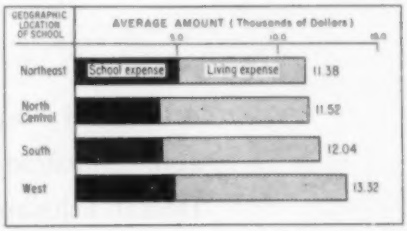


Fig. 15 • Four-year expenditures of dental students, by region: 1953-1954

CONCLUSION

The cost of a dental education varies widely from student to student and from school to school and, in fact, bears only limited relationship to the basic school charges for tuition and related items. Indeed, the most striking differences in student expenditures are those associated with marital status and living arrangements. For this reason, it is important in interpreting data presented in this chapter to remember that the marital status composition of the student body will be substantially altered as veterans complete their schooling and are replaced by nonveterans.

As a result, the reports submitted by nonveterans doubtless provide the most meaningful estimates of the cost of attending dental school. The average nonveteran spent approximately $10,900 for four years of school. This estimate, of course, is based on reports from both married and unmarried nonveterans and reflects a wide diversity of living arrangements. Single nonveterans living away from home spent approximately $10,300, on the average, to meet the cost of four years in school. Married nonveterans spent considerably more ($13,900), while single students living at home managed on substantially less ($8,200).

Additional hospital dental internships and residencies approved by the Council on Dental Education (supplement 5)

The Council on Dental Education and its Committee on Internships and Residencies has announced the approval of additional educational programs in several hospitals. Previous listings of approved internships and residencies appeared in the May 1954, August 1954, February 1955, May 1955 and August 1955 issues of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. Since changes in the status of approved programs and notice of additional programs approved are published periodically in THE JOURNAL, it is important that the applicants review all of the references cited for complete and current information. A complete listing of approved internship and residency programs is available from the Council on Dental Education on request.

All of the internships and residencies that have been approved or provisionally approved are recognized by the Council on Dental Education as accredited. The training programs designated with a double asterisk (**) are provisionally approved; all others are approved.

Hospital	Type of program approved	Length of program approved (months)	Number of positions available	Date the service begins
DISTRICT OF COLUMBIA				
Armed Forces Institute of Pathology Walter Reed Army Medical Center Washington, D. C. Col. Joseph L. Bernier, Chief of Dental Service	Residency Oral pathology	24	4	——
MICHIGAN				
Veterans Administration Hospital Fuller Road Ann Arbor, Michigan Dr. Jerome J. Hiniker, Chief of Dental Service	Residency Prosthodontics	24	1	January
Detroit Receiving Hospital 1326 St. Antoine Street Detroit 26, Michigan Dr. John H. Shackelford, Chief of Dental Service	Internship Oral surgery Residency Oral surgery	12 24	1 2	July July
MISSOURI				
Jewish Hospital 216 S. Kingshighway St. Louis, Missouri Dr. Jerome S. Grosby, Chief of Dental Service	Internship Rotating	12	1	July

Hospital	Type of program approved	Length of program approved (months)	Number of positions available	Date the service begins
NEW YORK				
Veterans Administration Hospital 130 West Kingsbridge Road Bronx, New York Dr. Max A. Pleasure, Chief of Dental Service	Residency Oral surgery	24	1	July
The Rochester General Hospital 501 Main Street West Rochester 8, New York Dr. A. B. Riffle, Chief of Dental Service	Internship Rotating	12	1	July
PENNSYLVANIA				
The Western Pennsylvania Hospital 4800 Friendship Avenue Pittsburgh 24, Pennsylvania Dr. J. A. Gardner, Chief of Dental Service	Internship Oral surgery	12	1	July

The following change has been made in the list of approved internship and residency programs published in the May 1954 issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. The Council has approved the second year of the residency in oral surgery at the U. S. Naval Hospital, St. Albans, L. I., New York, so the listing now appears as follows:

NEW YORK				
U. S. Naval Hospital St. Albans, L.I., New York Capt. Charles F. Hoyt, Chief of Dental Service	Internship Rotating Residency Oral surgery	12 24	4 2	July July

FEBRUARY 1956

LON W. MORREY, D.D.S., EDITOR

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Editorials

Principles of Ethics

Elsewhere in this issue is published the revised *Principles of Ethics* of the American Dental Association which was approved by the House of Delegates at the ninety-sixth annual session of the Association in San Francisco last October. The text of the present instrument has been arrived at after months of study by the Judicial Council aided by advice from the officers, trustees and council members of the Association and others interested in improving the wording of the rules relating to the character and conduct of the profession.

Ethics is the bedrock on which a profession is founded. It is the bedrock on which civilization, itself, is founded. Without ethics there would be moral chaos. The province of ethics is character and conduct and the value a society or an individual places on them.

Modern society's concept of ethics is the outgrowth of slow and unconscious alterations of man's behavior and ideals. Modern dentistry's concept of ethics is the result of slow, unconscious alterations in habits of practice and customs of conduct. Many principles which the conscientious practitioner of today accepts as fundamental were considered—if they were considered at all—of little or no significance by their predecessors of a century or so ago.

Fortunately, however, the forefathers of dental organization and the predecessors of the American Dental Association—the founders of the American Society of Dental Surgeons—realized that ethics was the foundation on which the profession must be built. Article one of the Constitution of the American Society of Dental Surgeons adopted in 1840 set forth its objects as follows:

The objects of this Society are to promote union and harmony among all respectable and well informed Dental Surgeons; to advance the science by free communication and interchange of sentiments, either written or verbal, between members of the Society, both in this and other countries; in fine, to give character and respectability to the profession, by establishing a line of distinction between the truly meritorious and skilful, and such as riot in the ill gotten fruit of unblushing impudence and empiricism.

Article seven provided a means of enforcement:

Any member of the Society may be expelled for immoral conduct, malpractice in business or other sufficient cause, on motion of one member, seconded by another at any regular meeting of the Society in which case a majority of three-fourths of the members present shall be required.

Out of the one hundred and sixteen years of experience that have elapsed since those broad and somewhat vague standards of conduct were stated, have grown today's *Principles of Ethics* consisting of twenty-one sections, each of which is both broad enough and specific enough to guide the conduct of most members. Necessarily they are national principles. Their effectiveness will depend on the manner in which they are interpreted, applied and, in some instances, extended at the local level. Besides being published in this issue, a copy has been mailed every member of the Association.

No member can afford not to keep his copy of the *Principles of Ethics* ever handy in his office. No member can afford not to review the text occasionally, if for no other reason than to remind himself that there is "a line of distinction between the truly meritorious and skilful, and such as riot in the ill gotten fruit of unblushing impudence and empiricism."

It is dues paying time

December, January and February are dues paying months in America. According to custom, members are showered during that period with "please remit" reminders. Members of dental organizations are not excepted. Annual membership dues in the American Dental Association were due on January 1, and members who wish to maintain a continuous membership record strive to meet that date.

Although the *Constitution and Bylaws* specifies that the fiscal year of the Association shall begin on January 1 of each calendar year and that dues should be paid by that date, it does take into account the frailties of nature and makes provision for those who procrastinate by providing such members a period of ninety days grace. The following amendment to the *Constitution and Bylaws,* approved by the House of Delegates at the ninety-sixth annual session of the Association, establishes March 31 as the deadline for the payment of dues:

An active member whose dues for the current year have not been paid by March 31 of that year shall cease to be a member of the Association. Reinstatement of membership may be secured on the payment of dues of this Association in accordance with Chapter XVI, Section 1-A and on compliance with the pertinent bylaws and regulations of the constituent and component societies involved.

Members who fail to remit their dues in time to have them recorded in the Central Office by March 31 will forfeit the benefits of the organization for the period of weeks

or months before such payment is received and membership reinstated. In addition to cutting themselves off from the many direct benefits of the Association, delinquent members may place in jeopardy their insurance—life, health and accident—sponsored by the Association or by the constituent and component societies.

Inasmuch as it takes some time for dues to be forwarded by the component society secretary to the constituent society secretary and by him to the Central Office of the Association, members who do not wish to overstep the March 31 deadline are urged to remit their dues to their local secretary now.

The dues of active members in the Association are twenty dollars; to which must be added the state and district society dues. The dues of affiliate and associate members are ten dollars and dues of student members, three dollars and fifty cents per year. Life and honorary members are exempt from the payment of dues.

The splendid membership record of the Association is a tribute to the labors of the membership committees—national, state and local—and to the constituent and component secretaries whose duty it is to collect the dues and maintain accurate membership files.

The failure of a member to cooperate with his committeemen and secretary multiplies labor, retards membership growth and reacts unfavorably on the member himself and on his family.

Help move the mountain to the hungry

Appeals from Care—the Co-operative for American Remittances to Everywhere, Incorporated—continue to point out that it is not too late to join the thousands of other patriotic citizens of the United States in helping our government to move America's gigantic food surpluses to the starving millions in the less fortunate parts of the world.

Of the seven billion dollars worth of surplus food which the government now has stockpiled in this country, huge amounts of dairy products are being made available to Care free. Your check for a dollar addressed to Care will enable that organization to forward a twenty-two pound package of such products to a needy family overseas. Sounds like a miracle? It will be a miracle to the famished family that receives the gift that your dollar makes possible, because the products contained in one twenty-two pound package will feed the average needy recipient for at least a month. Your name goes on each package you send making yours a personal gift and indicating to the recipient your personal good will as well as the good will of America.

Last year the Food Crusade was one of the most successful ventures in Care's history. Thousands of Americans—dentists and others—joined forces to ship millions of pounds of food surplus overseas. This year, with your help, Care's Food Crusade should be bigger and better than ever. Slip a dollar bill or your check for a like amount into an envelope and mail today to Care Food Crusade, 660 First Ave., New York City, New York.

Federal financial support of dental research is certain to be substantially increased beginning next July. The governmental budget submitted to Congress by President Eisenhower on January 16 allots $2,971,000 for U. S. Public Health Service dental health activities—an increase of about 30 per cent above the appropriation for 1955-56. Of this sum, $800,000 is earmarked for dental research grants in aid to nonfederal institutions; $300,000 for research fellowships, and $876,500 for operation of the National Institute of Dental Research.

The other major budgetary item is $694,200 for professional and technical assistance to states and communities for development of effective dental public health methods, fluoridation projects among them. Administration and coordination activities account for the remainder of the proposed appropriation for 1956-57.

Still missing from the President's budget are funds for building a separate laboratory for the National Institute of Dental Research on the grounds of the National Institutes of Health in suburban Bethesda, Md. It is noteworthy, however, that the sum recommended for research grants is almost double this year's $421,000, and the fellowship item of $300,000 is treble the amount appropriated for 1955-56. Also, an $84,000 increase was approved for NIDR's internal research program.

The $196,100 provided for "coordination and development of dental resources" compares with $116,400 available this year. It was explained that "the increase in 1957 provides for investigations of problems associated with dental health insurance programs and payment methods." This activity is under direction of Walter J. Pelton, head of the U.S. Public Health Service division of dental resources.

Since Congress rarely, if ever, reduces the President's estimates for health and research programs—and generally increases them—it is virtually certain that $2,971,000 is the minimum that will be appropriated for the next fiscal year with regard to dental public health and re-research operations.

VA BUDGET

The Veterans Administration budget allocates $8,415,000 for fee basis dental services, which is the smallest sum recommended since the "home town" dental care plan was inaugurated nearly a decade ago. For fee service medical care, $8,312,500 was allowed in the budget.

Dental fee basis allocation is based on estimates of 39,000 examinations and 62,000 treatments by private dentists during the fiscal year beginning July 1, 1956. This compares with this year's estimates of 43,000 and 83,000, respectively.

President Eisenhower's new budget asks also for 40 million dollars for launching a new government program of construction subsidies to aid medical, dental and certain other professional schools, as well as other nonprofit institutions engaged in training and research in the health sciences. Such an appropriation would have to be authorized by enabling legislation, which the White House plans to submit to Congress some time before the middle of February.

In a similar category is the 10 million dollar item provided for federal mortgage loan insurance to assist hospitals and clinics. An authorizing bill was introduced in Congress in 1955 but was not acted upon.

Frank B. Berry, M.D., Assistant Sec-

retary of Defense for Health and Medical Affairs, has scheduled January 30 for the first meeting of the newly established Department of Defense Dental Advisory Committee. Its chairman is Thomas P. Fox, of Philadelphia, dental representative on Dr. Berry's Civilian Health and Medical Advisory Council.

Other committee members are Francis J. Reichmann of Oklahoma City; John C. Brauer of Chapel Hill, N. C., Daniel F. Lynch of Washington, D. C., and chief dental officers of the Army, Navy and Air Force.

Their counsel will be sought on such matters as quality and quantity of dental services given to active duty personnel and dependents, military requirements for dental personnel and auxiliaries, training programs and personnel procurement procedures.

CAREER INCENTIVE PROGRAM

The House Committee on Armed Services plans to open public hearings in late January or early February on a medical-dental career incentive bill recently submitted to Congress by the Department of Defense. When these hearings are concluded, the committee intends to conduct others on a bill, sponsored by Chairman Carl Vinson (D. Ga.), designed to broaden health care benefits for dependents of servicemen.

As drafted by the Defense Department, the career incentive plan would not have increased constructive service credit for medical and dental officers only but would have authorized bonuses ranging up to $1,800 a year for officers in both corps who agreed to serve protracted periods of active duty. The latter inducement, however, was vetoed by the Budget Bureau, so that only the constructive service feature—which is in the nature of a promotion scheme—remains in the pending bill.

It increases the service credit to four years for dentists and five for physicians. At present the service credit is three and four years respectively. In addition, the incentive plan permits initial commissioning in grades of captain (Army and Air Force) and lieutenant (Navy), provided the candidate has been out of medical or dental school at least one year.

The promotion plan is one of several inducements devised by a Department of Defense task force which is seeking to strengthen voluntary procurement in order to preclude further extension of the doctor-draft law.

"During the last three fiscal years," says a Department of Defense letter which accompanied the bill draft to Congress, "19,985 medical and dental officers entered the military services under the impetus of the doctor draft act. During the same period 22,340 medical and dental officers left the military services and returned to civil life.

"Moreover, during this same period, 1,419 regular medical and dental officers resigned or otherwise left the service, while only 732 joined the regular service. This inordinately high rate of turnover is extremely expensive in terms of travel costs, uniform allowances and wasted man-hours. Of even greater importance is the fact that it creates such demoralizing and unsatisfactory conditions of service for the remaining career medical and dental officers that the over-all resignation rate for these officers is almost double the procurement rate."

International Correspondence

NEWS FROM GREAT BRITAIN

The new dentists' bill had its second reading in the House of Commons November 11. It then went to committee stage where the bill and any amendments are discussed and debated in detail by a standing committee of the House, made up of members of the House in approximately the same proportions as are the party memberships. These committee members are chosen for their interest or specialized knowledge of the subject under debate.

The Council of the British Dental Association, with the object of giving effect to Association policy as laid down by the Representative Board in October, drafted 18 amendments to the bill; of these, 17 appeared on the Order Paper, and 16 were called. Eleven of these were either incorporated in the bill or accepted in principle by the Minister for redrafting and presentation at a later stage; one, the Minister promised to consider and discuss in the House.

By far the most important amendment for safeguarding the public was the one that provides that ancillary workers must work not only under the direction of a registered dentist but must work only after the dentist has examined the patients and prescribed the treatment to be carried out. An amendment to safeguard the public by refusing to allow ancillary workers to extract deciduous teeth was not well received by the committee and was withdrawn.

The British Dental Association was concerned also with amendments affecting the profession as, for example, that on the constitution of the new General Dental Council. The general practitioner was at first underrepresented on the Council. After considerable debate the Minister of Health, Mr. Iain Macleod, agreed to increase the number of members elected by the general profession from nine to 11; the two extra seats will come from England. This will still leave the representatives elected by the general profession very much in the minority, that is, approximately 25 per cent.

Of a possible 43, 19 will be appointed by the dental licensing bodies (universities and colleges, etc.), seven by the Crown and now 11 elected by the general profession. The remaining six will come from the General Medical Council, which will sit while the General Dental Council is dealing with dental education and examination.

However, on the new disciplining committee of the General Dental Council, which will consist of the president and ten members of the new Council, the Minister has agreed that four must be elected members of the Council and two of the remaining six must be lay members so that the position of the general practitioner has been safeguarded, in that in discipline matters he will be judged by a proper proportion of his peers. Of interest to readers abroad is the fact that an amendment to provide an experiment in the training of dental technicians as ancillary workers was defeated by 24 votes to 4.

One might summarize the position to date by saying that the profession is fortunate in that the bill was presented to Parliament by a Minister who, although disagreeing entirely with the expressed policy of the Association regarding ancillary workers, has respected the views expressed and has considered sympathetically any constructive amendments put forward.

BRITISH DENTAL ASSOCIATION

W. Stewart Ross writes that a panel of speakers on fluoridation has now been compiled by the British Dental Association. The panel consists of lecturers from all over the country, and Association branches have been advised to include a paper on fluoridation in their program this season.

Arrangements are being made to provide for a comprehensive exhibition on public dental health at the annual meeting of the Association to be held in Brighton in June of next year. It is hoped that this exhibition will be open to the public. During the meeting a panel discussion will be held on dental health education.

The Ministry of Health leaflet on fluoridation of water supplies is to be distributed to all members of the British Dental Association. The Minister of Health was asked to arrange that no further experiments be carried out in the fluoridation of water without the approval of users who have no other source of supply. In a written reply, the Minister said he would make no arrangements for such approval.

There is a growing recognition of the fact that in this country dental knowledge and the principles of oral hygiene are but little known by the mass of the people. The statistics on the sale of toothbrushes bear testimony to this fact. For a population of 50 million, there are only approximately 20 million toothbrushes sold each year.

There are signs, however, that the public is slowly appreciating the importance of a healthy mouth, thanks to the work of such agencies as the Dental Board of the United Kingdom and the Oral Hygiene Service.

The Northumberland County Council annual report for 1954 contains extracts from area reports of the school dental officers headed by Mr. Robinson, principal school dental officer, who reports that the incidence of dental caries is definitely on the increase and there is a steady fall since 1948 in the number of children found dentally fit at routine inspections. On the treatment side, the picture is brighter in that there is a conservative ratio of 4.4 fillings to one extraction. The area dental officer reports make interesting if gloomy reading. There is the constant struggle of understaffing; rising school population; higher incidence; a low standard of oral hygiene, especially in young mothers, and only rarely, a caries-free deciduous or permanent dentition.

ITEMS OF INTEREST

The American Dental Society of London held its third meeting of the present session December 21 under the presidency of Sir Wilfred Fish. The speaker of the evening was Terrence Ward, well known in the maxillofacial world as head of the dental plastic department at Queen Victoria Hospital, East Grinstead. The subject of Dr. Ward's paper was recent advances in oral surgery, and it was a delight to listen to the very facile and simple way in which Terry Ward explained this most important subject. One can understand why he is in such popular demand as a speaker.

The Dental Board of the United Kingdom has just published a booklet entitled *Dentistry, a Career and a Future,* which has been distributed to every member of the dental profession in Great Britain. The information in the booklet was based on a survey made by the Dental Board among members of the profession regarding recruitment to the profession and is issued to attract young men and women to take up dentistry as a career. It is a splendid product and does show that "at the present time in Great Britain few professions are more thrillingly alive, few jobs offer greater opportunities to the keen young entrant, and above all, few careers hold out the chance of making so great a contribution to the health of the nation."

The British Society of Periodontology held its regular monthly meeting December 5 under the presidency of George Cross. Guy Morrant read a paper entitled "Bridgework—with Particular Relation to the Periodontal Tissues." Dr. Morrant analyzed his failures as well as his successes and did not lose sight of the fact that he was dealing with a periodontal aspect of bridgework.

The annual meeting of the Dental Implant Society of Great Britain took place December 15, at which time F. Frainin read a paper describing recent advances in the implant field. The second meeting was January 11. A tape recording of a 100 slide lecture on implants by Col. Roy L. Bodine (U.S. Army) was given.

EXPANSION OF LONDON SCHOOL

The premises occupied by one of the best known night clubs in the world, both before and after the two world wars, Ciro's of London, has been taken over by the Royal Dental Hospital of London School of Dental Surgery. The premises will provide a new lecture hall, rooms and laboratories for the junior academic staff, a metallurgist unit, a men's common room and will mean the retaining of the museum and library.

Prof. A. E. Richardson, president of the Royal Academy, presented the prizes at the annual prize distribution of the Royal Dental Hospital of London School of Dental Surgery, with C. Bowdler Henry presiding. In his address Professor Richardson had some interesting observations to make to the students and recent graduates. There was a great striving today after false luxury, he said. People indulged in what they thought was luxurious food. They rode about in luxury motor coaches, of the most vulgar streamline character. There was a demand for luxury looking goods, luxury flats, luxurious lounges. We had developed a sort of transatlantic view of luxury. It was most important to surgeons to have a knowlege of the arts.

Continuing, Professor Richardson said that the students had a great service before them, the service of their fellows. Nothing else mattered. It was not just a matter of making money; they were entering a profession which called for the greatest skill, the greatest kindliness and sympathy, and that was worth everything. It was worth all the things he had spoken of, the cheap illusions and the escapes.

G. H. Leatherman,
D.M.D., F.D.S., R.C.S., F.A.C.D.

Association Affairs

ASSOCIATION MEMBERSHIP UP TEN PER CENT IN FIVE YEARS

Year-end figures revealed that membership in the American Dental Association was nearly 85,000, the highest in history. The 1955 membership was about 2,500 higher than last year and slightly more than 4,700 over that of two years ago. The 1955 figure represented a 10 per cent increase in the last five years.

The 1955 categories of active and life members and that of affiliate members increased over 1954. Associate membership remained the same, honorary membership increased by three and student membership showed a slight drop. All the federal dental services and 46 constituent societies increased their membership; eight societies showed slight losses. The VA had the highest percentage increase of all the federal services.

Societies with the largest numerical increase were Southern California, 173; California, 142; Michigan, 142; New York, 139; Ohio, 116, and the V.A., 115. New York continued to be the largest society, with 10,784 members. Illinois, with 4,818 members, ran second, Pennsylvania, 4,787 was third; Ohio, 3,530, and Southern California, 3,514, were fourth and fifth.

DELEGATE REAPPORTIONMENT CHANGES FOUR STATES' VOTES

When the American Dental Association's House of Delegates meets October 1-4 in Atlantic City, N.J., there will be one member less in New York's delegation and in Iowa's, one more each from Southern California and Virginia. The changes result from the new system of proportional representation voted by the House in San Francisco last fall. Under this system, the total number of delegates is fixed at 416, and each society is entitled to delegates on the basis of its proportion of the total national membership.

At the same time that figures for state representation were released, it was announced also that official hotels for the 97th annual convention have been selected. They are the Chalfonte-Haddon Hall and Claridge Hotel. The House of Delegates will meet in the ballroom of the Auditorium as will the House Reference Committees. The scientific session will be held in the same building as the meetings of the House of Delegates. This is the first time such an arrangement has been made.

LABORATORY MEN TAKE PART IN ASSOCIATION WORKSHOP

Dental laboratory owners, technicians, teachers and dentists will participate in the workshop on the training of dental laboratory technicians to be held in Chicago March 5-7, announces Gerald Timmons, chairman of the Council on Dental Education. The workshop is sponsored by the Association's Councils on Dental Education and Dental Trade and Laboratory Relations.

Among the speakers on the two day program are Joseph E. Kennedy, dental laboratory owner, who will speak on the function of the laboratory as viewed by an owner; Bernie Sudakoff, laboratory technician, who will present the technician's viewpoint, and G. Paul Stough, chairman of the education committee of the National Association of Dental Laboratories. Mr. Stough will discuss the newly inaugurated Certification Program for Dental Laboratory Technology sub-

mitted by the National Board of Certification for Dental Laboratory Technology.

Other speakers are J. Eugene Ziegler, director of the School of Dental Laboratory Technicians at the University of California Extension in Los Angeles; Mr. Herman Wald, supervisor of the dental laboratory technology course at the New York City Community College of Applied Arts and Sciences; Mr. Bernard J. Beazley, secretary, and Walter E. Dundon, chairman, of the American Dental Association's Council on Dental Trade and Laboratory Relations.

Although attendance at the workshop is open to all persons interested in the education of technicians, space limitations require advance registration. Advance registration may be obtained by writing to the Council on Dental Education at the American Dental Association's Central Office.

FILM LIBRARY HAS NEW SLIDES ON MALOCCLUSION

A new series of slides on occlusion and malocclusion suitable for showing by a dentist to nonprofessional groups may be rented or purchased through the Association's Film Library. The slides were produced in 1955 by T. M. Graber of the Northwestern University Dental School. They replace two series listed as S15 and S16 in Association catalogues.

The series has as its theme preventive orthodontics and is most suitable for presentation in several lectures. Subjects covered are kinds of malocclusion, their causes and effects, treatment and fixed orthodontic appliances used in treatment. Rental fee is $1.50 a series. The purchase price is 55 cents each for black and white slides; $1.00 each for color.

VARIETY OF EVENTS MARK DENTAL HEALTH WEEK

Television, radio, posters, meetings and contests will be used by dental societies throughout the nation as they celebrate Children's Dental Health Week February 5-11. The Association's Bureau of Public Information has announced that requests for promotional materials have far exceeded any previous year. Numerous organizations are cooperating with the dental profession in calling attention to the event.

The International Apple Association is one of the many groups cooperating in the observance of Children's Dental Health Week. Its posters may be obtained from the Apple Association, 1302 18th St., N.W., Washington 6, D.C.

SPEAKERS SELECTED FOR 12TH LICENSURE CONGRESS

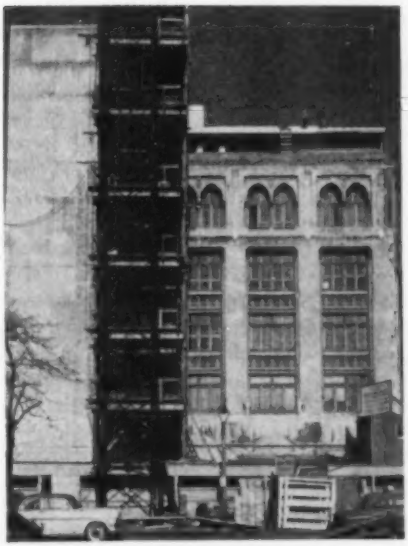
Speakers have been selected for the Twelfth Congress on Dental Education and Licensure which will be held by the Council on Dental Education February 4 at the Conrad Hilton Hotel in Chicago.

Papers on "Intramural Practice Plans for Dental Schools" will be presented at the morning session by James T. Ginn, dean of the College of Dentistry, University of Tennessee; John C. Brauer, dean of the School of Dentistry, University of North Carolina; Donald C. Conzett, M.D., University of Iowa hospital; William H. Crawford, dean of the School of Dentistry, University of Minnesota, and J. Ben Robinson, dean of the School of Dentistry, West Virginia University. Gerald D. Timmons, chairman of the Association's Council, will preside.

The topic for the afternoon session, "Selection and Use of Basic Science Examinations by Licensure Boards," will be discussed by Lawrence J. Dunn, member of the New York State Board of Dental Examiners; Walter A. Wilson, dean of the Dental School, Fairleigh Dickinson College; Frank O. Alford, member of the American Dental Association's Council on the National Board of Dental Examiners, and George W. Teuscher, dean of the Dental School, Northwestern University. Moderator for the afternoon is Carl A. Laughlin, vice-chairman of the Council on Dental Education.

ITEMS FROM 22 COUNTRIES IN NEW MAGAZINE'S FIRST ISSUE

The first issue of the Association's new magazine DENTAL ABSTRACTS, which appeared in mid-January, contained abstracts from articles published in 62 dental and allied periodicals from 22 countries. Of the 104 items, 75 appeared first in English language publications and 29 in other languages. "It would be an impossible task for the average dentist to try to find these articles for himself," said Lon W. Morrey, editor, in commenting on the first edition. "DENTAL ABSTRACTS brings together in one place the important research from all over the world. The continuing education of the dentist is thus made easier."



On November 12 the additional story and the stone pylon of the Association's headquarters were under construction. Part of the new section of the building will be in use in February.

Among the articles abstracted for the first issue were the ninth and tenth articles in the series on the Newburgh-Kingston caries fluoride study, an article published originally in Spanish on a nervous disorder as a cause of periodontosis, one on occipito-mental anchorage in orthodontic treatment of dental deformities due to cleft lip and palate published first in England and one on rubber base elastic impression material.

The February issue will contain articles in basic science, periodontics and endodontics, operative dentistry, orthodontics, oral surgery and professional activities.

THIRTEEN GROUPS TOP RELIEF FUND QUOTAS IN JANUARY

Twelve constituent societies and the U.S. Public Health Service had more than made their quotas in the 1955-56 Relief Fund campaign by mid-January. As of January 12, a total of $81,340.96 had been contributed toward the $100,000 goal. The societies which reached their quotas during the month were Arkansas, Panama Canal Zone, U.S. Public Health Service, Southern California, Nebraska and Washington. Tennessee, which has led the societies from the start, has more than tripled its quota with a contribution of $4,485.50 to date. The smaller societies contributed 84 per cent of their quotas; the larger ones, 80.2 per cent. Student contributions were $641.22.

Payments as of January 12 were:

Quota of $1,000 or more

	Quota	Contributions to Jan. 12	Pct.
California	$ 3,770.00	$ 3,556.00	94.3
So. California	4,720.00	4,841.00	102.6
Connecticut	1,940.00	1,657.00	85.4
Florida	1,420.00	1,346.00	94.8
Georgia	1,070.00	527.00	49.3
Illinois	7,120.00	6,776.50	95.2
Indiana	2,270.00	2,144.93	94.5
Iowa	1,780.00	1,626.00	91.4
Kansas	1,000.00	898.30	89.8
Kentucky	1,160.00	663.00	57.2
Louisiana	1,020.00	817.50	80.2
Maryland	1,100.00	1,080.00	98.9
Massachusetts	3,660.00	1,303.50	35.6
Michigan	4,090.00	3,392.40	82.9
Minnesota	2,770.00	2,328.00	84.1
Missouri	2,420.00	1,915.00	79.1
Navy	1,050.00	432.00	41.1
Nebraska	1,000.00	1,023.00	102.3
New Jersey	4,010.00	3,145.00	78.4
New York	15,020.00	8,886.00	59.2
N. Carolina	1,300.00	1,002.00	77.1
Ohio	4,940.00	3,840.50	77.7
Oregon	1,270.00	1,189.00	93.6
Pennsylvania	6,790.00	4,196.50	61.8
Tennessee	1,360.00	4,485.50	329.8
Texas	3,240.00	1,825.50	56.3
Virginia	1,190.00	1,122.50	94.3
Washington	1,810.00	1,842.00	101.8
Wisconsin	2,950.00	2,083.50	70.6
Total	$87,240.00	$69,945.13	80.2

Quota under $1,000

	Quota	Contributions to Jan. 12	Pct.
Air Force	$ 540.00	$ 302.75	56.1
Alabama	820.00	1,397.50	170.4
Alaska	50.00	25.00	50.0
Arizona	310.00	147.50	47.6
Arkansas	550.00	572.00	104.0
Army	520.00	238.50	45.9
Colorado	970.00	822.50	84.8
Delaware	150.00	148.00	98.7
Dist. of Col.	800.00	607.50	75.9
Hawaii	370.00	508.00	137.3
Idaho	290.00	97.00	33.5
Maine	460.00	337.50	73.4
Mississippi	540.00	371.00	68.7
Montana	360.00	461.00	128.1
Nevada	100.00	147.00	147.0
N. Hampshire	320.00	282.50	88.3
New Mexico	250.00	229.00	91.6
North Dakota	320.00	424.05	132.5
Oklahoma	900.00	711.00	79.0
Panama C. Z.	20.00	22.00	110.0
P. H. Service	200.00	216.00	108.0
Puerto Rico	240.00	130.25	54.3
Rhode Island	550.00	252.00	45.8
So. Carolina	470.00	322.00	68.5
South Dakota	320.00	459.00	143.4
Utah	480.00	329.50	68.7
Vermont	190.00	129.00	67.9
Vet. Admin.	770.00	325.50	42.3
W. Virginia	740.00	555.50	75.1
Wyoming	160.00	150.00	93.8
Total	$12,760.00	$10,720.05	84.0

INSURANCE PREMIUMS MAY BE DEDUCTED FROM INCOME TAX

Disability insurance premiums paid by dentists are deductible from gross income in figuring income tax in the same way as other necessary business expense items are deductible. The recent ruling is explained in the Revised Ruling 55-264, Internal Revenue Bulletin 1955-19,8. Included under "professional overhead expense" would be premiums for such insurance as the American Dental Association's health and accident policy and plans operated by state societies. Dentists are advised to consult with their attorneys or tax consultants on the applicability of this item to their 1955 federal income tax statement.

LETTERS ON INSURANCE PROGRAMS SENT TO MEMBERS

Information on the recently expanded American Dental Association's Group Life Insurance Program has been sent to all Association members. The new program, which became effective January 1, provides maximum life insurance protection of $10,000 up to the age of 60 as compared with the old program which provided a maximum of $5,000 up to the age of 52. Other benefits have also been increased substantially.

LOWER PRICE, NEW FORMAT FOR BOOKLET ON DIET AND HEALTH

Diet and Dental Health, a publication of the Association's Bureau of Dental Health Education, is now available in a new format and at a new low price. Designed to help patients understand the relation of diet to the development of teeth and jaws, to tooth decay and periodontal disease, the booklet includes information on the role of sugar in tooth decay, fluorine as a dietary essential and vitamin deficiencies as a cause of periodontal disease. Also included is a discussion of the physical aspects of food—characteristics which make some foods detergent and others impacting. An extensive list of well-known foods with their hidden sugar content is provided.

Diet and Dental Health may be obtained from the Order Department at the Central Office at the following prices: 25 copies, $1.95; 50 copies, $3.30; 100 copies, $5.65.

SUBSCRIPTS • *Clinical Testing of Dental Caries Preventives,* the report of the 1953 Conference to Develop Uniform Standards and Procedures in Clinical Studies of Dental Caries, may be obtained for $1 from the Order Department. The supply of free booklets is exhausted. . . . *Patient Education Illustrated,* a tranvision chart in color, also available from the Order Department, is priced at $3. . . . The index to THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION for the period January to June 1955 may be obtained from the Subscription Department. . . . The Board of Trustees meets April 2 and 3.

Legislation

HEALTH INSURANCE TO BE MAJOR ITEM ON CAPITOL HILL

Health legislation will be a major concern of the 84th Congress, whose second session got under way last month. The President's State of the Union message delivered January 5, the Budget submitted at mid-month and the bills introduced in the opening days of the new session attest to this. Of major interest to dentistry will be funds for dental research, Old Age and Survivors' Insurance, the Jenkins-Keogh bill, federal aid to construction of medical education and research facilities and various health insurance plans.

Representatives of the Association have already testified on two measures. J. Claude Earnest, a member of the Council on Legislation, appeared before a Senate committee January 23 to testify on O.A.S.I. On January 25, the Association testified on dental care for military dependents.

The President's State of the Union message, to be supplemented by a special health message at the end of January or early in February, outlined four areas in which the Chief Executive said action would be proposed. He called for further expansion of O.A.S.I., for federal reinsurance or other measures designed to

foster extension of voluntary health insurance to more people, for a "well-supported, well-balanced program of research," and fo. "proper medical care" for military dependents. The President indicated also that a career incentive program for medical and dental officers was part of the Administration's plan.

Additional funds for dental research seemed assured with the issuance of the proposed budget January 16. The budget calls for an appropriation of $2,971,000 for the dental health activities of the U.S. Public Health Service, a figure about 30 per cent more than that appropriated for the fiscal year 1955-56. Within this budget, funds for grants to non-federal institutions, for research fellowships and for operation of the National Institute for Dental Research are increased. Missing is an item for a new building for the NIDR, an appropriation requested previously by the American Dental Association.

A second item in the budget of interest to dentistry is the $8,415,000 earmarked for the Veterans Administration outpatient dental care program. The amount is less than that in the previous budget; the VA anticipates a smaller volume of examinations and treatment.

In the area of military medical and dental care, a bill prepared by the Department of Defense and introduced by Rep. Vinson (D., Ga.), chairman of the House Armed Services Committee, stresses prepaid health insurance as a method to provide medical care for dependents of servicemen. Under the insurance plan civilian doctors and hospitals would furnish services, and the serviceman would bear part of the premium cost. Amendments to the measure are expected after results come in from the Blue Cross and Blue Shield survey now being conducted by these groups for the Defense Department to see what services can be provided.

The Defense Department is asking also that Congress permit additional credit for the education of physicians and dentists in the determination of their permanent military rank. This proposed move is part of the Department's attempt to make military careers more attractive.

The Administration's expressed intent to extend health care benefits to more people found support in a January 2 report of the Subcommittee on Low-Income Families of the Joint Congressional Committee on the Economic Report.

Among recommendations of the subcommittee were stimulation of means to provide adequate health care to farm families, consideration of federal health insurance grants to pay part of the cost of insurance for low income groups and federal temporary and permanent disability insurance.

The question of disability insurance will be considered also when the O.A.S.I. bill passed by the House at the last session comes up for Senate action.

Dental Societies

THIRD SOCIETY ANNOUNCES CENTENNIAL CELEBRATION

The North Carolina Dental Society, the third society to announce it would celebrate its centennial this year, has set the date of its anniversary meeting for May 13-16. The four day meeting will be held in Pinehurst. Bernerd C. Kingsbury, president of the American Dental Association, has been invited to be a featured speaker. A banquet and costume ball, at which the costumes will be those of 100 years ago, are planned also. In addition, there will be a program of essays and table clinics.

The North Carolina Dental Society was organized in the city of Raleigh on October 16, 1856. Eight dentists attended the first meeting. Graduation

from a dental college was made a prerequisite for membership in the new organization; the society claims to be the first to establish so high a membership standard.

Meetings of the society were held annually until the Civil War, and the group was reorganized in 1875. In 1879, the North Carolina dentists were successful in having the state legislature pass a law establishing a Board of Dental Examiners. In 1933, as a result of the efforts of the profession, the legislature passed the first antiadvertising law. And in 1949, a dental school was established in the state.

DENTAL SERVICE CORPORATION NOW LEGAL IN PENNSYLVANIA

Two laws recently enacted make it possible for the Pennsylvania State Dental Society to establish a dental service corporation for the administration of group dental health care plans. Mr. Ray Cobaugh, executive secretary of the Pennsylvania Society, which sponsored the laws, explained that the society is not obliged but merely allowed to set up such a corporation.

"This legislation does not make us do anything nor does it commit us to a course of action," he said. "It merely makes it legally possible to set up a corporation if we want to."

Safeguards for the profession are contained in the new legislation. The laws provide that a nonprofit dental service corporation "shall impose no restrictions on the doctors of dental surgery who administer to its subscribers as to methods of diagnosis or treatment." The doctor-patient relation shall be that which "ordinarily exists in the community." The patient shall have the right to choose his own dentist, and questions involving professional ethics and the service rendered by a dentist shall be determined only by the dental profession.

TWO SOCIETY PUBLICATIONS APPEAR WITH NEW FORMAT

Two West Coast dental journals, the *Southern California State Dental Association Journal* and the *Washington State Dental Journal,* recently have adopted a new format. The Washington journal has been enlarged to give an estimated 80 per cent increase in space. Layout, type, arrangement of material and headings have been redesigned. In addition, editor Donald E. Compaan announces that improvements in content are to be expected. An advisory committee representative of the various fields of dentistry has been appointed by the editor to advise on *Journal* articles. Southern California's journal also has a consultant editorial board. It, too, has increased its page size and changed its format. J. Lorenz Jones is editor.

WISCONSIN SOCIETY PROGRAM INCLUDES 14 STUDY COURSES

Fourteen study courses as well as motion pictures and table clinics have been planned for the 86th annual meeting of the Wisconsin State Dental Society to be held in Milwaukee April 9-11. Among the essayists are Keith Fenton Box of Toronto, Canada; Lester W. Burket of Philadelphia; Ralph L. Ireland of Lincoln, Neb.; Waldemar A. Link of Chicago; William R. Nelson, M.D., of Denver; S. Howard Payne of Buffalo; R. Quentin Royer of Rochester, Minn.; Alver Selberg of San Francisco, and Miss Archanna Morrison of West Roxbury, Mass. Bernerd C. Kingsbury, president of the American Dental Association, will address the first general session.

SOCIETY SPONSORS WORKSHOP ON PROFESSIONAL EDUCATION

Professional education of dentists for tomorrow is the theme of the first of three dental education workshops planned for

1956 by the First District Dental Society of New York. The workshops are sponsored by the Henry Spenadel Fund for the Advancement of Education in Dentistry, which the New York society administers. Among speakers at the first workshop, scheduled for April 20, are Raymond J. Nagle, dean of the New York University College of Dentistry; Percy T. Phillips, Second District Trustee; Maurice J. Hickey, dean of the School of Dental and Oral Surgery, Columbia University; Ormonde J. McCormack, president of the Dental Society of the State of New York, and Walter A. Wilson, dean of Fairleigh Dickinson College School of Dentistry. Alfred J. Asgis is director of the 1956 series of workshops.

SUBSCRIPTS • Nearly 14 million dollars in dental health care has been financed by the Los Angeles County Dental Society's postpayment plan during its first five years of operation, according to a recent report by S. Mayo Silverman, chairman of the society's board of governors. . . . The California State Dental Association's plan, now ending one year's operation, has reduced for a second time the amount withheld from dentists' fees as a reserve for losses. Three per cent is now held for reserve. . . . A special eight page roto section publicizing the 100th anniversary of the St. Louis Dental Society has been published by the *St. Louis Globe-Democrat*. . . . The Colorado State Dental Association has voted to endorse the use of mouth protectors by all athletic teams.

Dental Education

BASIC SCIENCE TEACHING IS TOPIC AT SCHOOLS' MEETING

The correlation of the teaching of basic science with clinical practice, plans for a survey of dentistry and the use and misuse of audio-visual material in teaching are the subjects of general sessions at the March 25-28 meeting of the American Association of Dental Schools. The schools' group will meet at the Jefferson Hotel in St. Louis.

In addition to the general sessions, conferences are planned on other aspects of teaching, including the teaching of nutrition and dietetics, operative dentistry, oral surgery and anesthesia, partial denture prosthodontics, pedodontics and periodontics.

Conferences on dental hygiene education and on the preparation of clinical teachers in dentistry also are planned. One session will be held on clinic administration, a session which will include discussion of the use of data-processing machines in clinic teaching and administration. Sessions are planned on practice management and pharmacology.

The general sessions will be presided over by Roy G. Ellis, dean of the faculty of Dentistry, University of Toronto; Maynard K. Hine, dean of the School of Dentistry, Indiana University, and William H. Crawford, dean of the School of Dentistry, University of Minnesota.

REPORT TWO APPLY FOR EACH SCHOOL OPENING

Some 7,200 applicants submitted 15,222 applications for 3,445 openings in the dental schools' freshman classes for the fall term of 1955. The better than two to one ratio of applicants to openings was reported in a survey made by the American Dental Association's Council on Dental Education.

In addition to the totals, the survey shows the ratio of applications received by each dental school to the number of students accepted, the states from which

each school drew its freshmen, the number of applications submitted by the applicants from each state and the ratio of applicants to dental schools from each state to the number of the state's college students.

"Previously, each school has known its application-freshman ratio and the home states of its students," Shailer Peterson, Council Secretary, said in commenting on the report. "Now an interschool and regional comparison is possible. The report will be helpful to the states also in showing them how their young people fare in getting into dental school and in providing information needed by states considering construction of new schools."

The two states providing the greatest number of dental students were New York (1,483) and California (1,028). Graduates for 1955 numbered 3,081. This total reflected an increase of 96 per cent during the eight years from 1949 to 1955.

The figures were published in the *Dental Students' Register*, which is available from the American Dental Association's Council on Dental Education at the Central Office.

Figures released at the same time by the government's Office of Education showed that in 1955 7,056 physicians were graduated; 5,240 students received nursing degrees and 3,396 graduated in pharmacy.

PUBLIC HEALTH SCHOLARSHIPS AVAILABLE AT HARVARD

Scholarships for the academic year 1956-57 are available to dentists and others in the health professions who want postgraduate education in public health or in one of the basic sciences related to public health. Awards being made by Harvard University School of Public Health in Boston range from part tuition to tuition plus a stipend. Scholarship applicants must return completed admission and scholarship applications to the school by March 1. Awards will be made in May.

1955 TOPS 1954 AS SCHOOL ENROLLMENT RISES AGAIN

Enrollment in the nation's dental schools in 1955 topped that of 1954 to continue the upward trend of recent years and to reach a point 54 per cent above that of a decade ago. As of October 15, 1955, there were 15,268 students registered as compared to 14,971 on the same date last year. Of this year's total, 12,730 were undergraduates.

The enrollment in dental hygiene schools also increased. There were 2,009 students registered in 1955 as compared with 1,938 last year.

SCHOOLS ANNOUNCE COURSES FOR SPRING SEMESTER

Baylor • The division of graduate studies, Baylor University College of Dentistry in Dallas, Texas, announces two graduate courses of study in periodontology which begin in September 1956. The first, a nine month course, leads to the degree of Bachelor of Science in Dentistry, and consists half of advanced study in basic science and half of clinical study. The second, a 20 month course, leads to a Master of Science degree. A thesis is required. Additional information can be obtained from the registrar at the College.

California • February 17-19 are the dates of a course by Herman Becks in the fundamentals of clinical diagnosis in dental medicine to be given by the College of Dentistry, University of California. A refresher course covering 16 subjects is offered April 16 to June 12. Laboratory technics, clinical operations and the use of foil and amalgam are included. Information may be obtained from the University of California dental program, 815 S. Hill St., Los Angeles 14.

Indiana • A postgraduate course in dentistry for children has been announced by the Indiana University School of Dentistry in Indianapolis. The class will run April 16-19. Seven faculty members will teach this refresher course, which will include illustrated lectures, televised clinical demonstrations and group discussion.

Iowa • The hydrocolloid indirect technic will be taught at the College of Dentistry, State University of Iowa, in Iowa City March 29-31. Faculty for the course is Ray V. Smith, William R. Kern and Percy W. Herrick.

Loyola (Chicago) • The postgraduate division of the Loyola (Chicago) University School of Dentistry announces a combined course in anatomy and cadaver surgery March 9-16. Harry Sicher will lecture at the dissection table during the first part of the course. Special emphasis will be given to clinical application of material discussed. Joseph Kostrubala will review pertinent surgical anatomy of the oral region. Lectures on pathology and physiology are to follow. Students will perform the various types of operation on cadavers, including open and closed reduction of mandibular fractures, partial resection of the mandible with bone grafting and resection of the maxilla for tumors.

Pennsylvania • Eight graduate courses in various aspects of dentistry will be taught during the coming months at the School of Dentistry, University of Pennsylvania, in Philadelphia. They are: complete denture prosthesis, March 12-17 and March 19-24; crown and bridge prosthesis, March 5-10; hydrocolloid indirect technic for inlays and bridges, February 11 and 12; endodontics, April 12-27; periodontal prosthesis (to be held at Skytop Lodge, Skytop, Pa.), April 22-27; oral surgery and anesthesia, February 20-25, and periodontal prosthesis, February 27 to March 3.

Otto Freitag (left), vice-dean of St. Louis University School of Dentistry, receives a gift of $1,000 from Sam Pagano, president of the St. Louis University Dental Alumni. Dr. Freitag was honored for his 35 years as a faculty member at a testimonial dinner in St. Louis November 27. The Very Rev. Paul C. Reinert, S.J., (center) president of St. Louis University, headed the list of dignitaries who were in attendance. Some 325 persons were at the banquet.

Tennessee • Members for a nine months' course in postgraduate pedodontics at the University of Tennessee College of Dentistry in Memphis will be chosen March 1, according to a recent announcement from the school. The school also announces a two day postgraduate course, March 5 and 6, in dentistry for children.

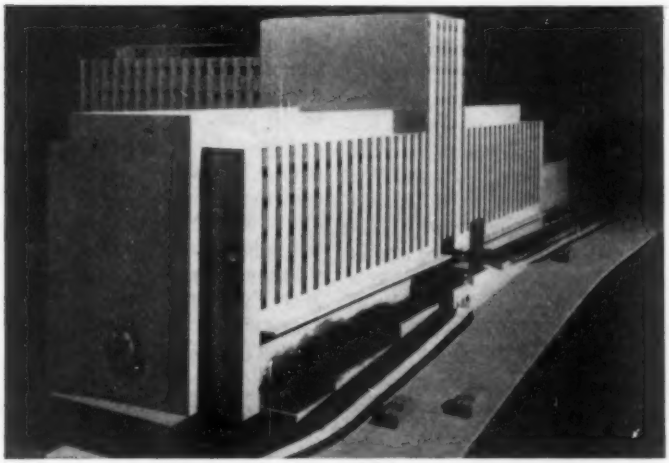
Toronto • Short postgraduate courses offered by the University of Toronto Faculty of Dentistry in Toronto, Ontario, include: endodontics, March 5-9; orthodontics, March 19-23; periodontics, April 23-27, and dental oral surgery and anesthesia, April 30 to May 4.

Tufts • The technics for using hydrocolloid and synthetic rubber base impression materials is the subject of a two day course scheduled for April 27 and 28 at Tufts University School of Dental Medicine in Boston. Each participant will have the opportunity to take impressions under supervision so as to familiarize himself with the working qualities of these materials.

Washington • The University of Washington School of Dentistry in Seattle has scheduled a refresher course entitled "Dental Materials for the General Practitioner" March 5 and 6. Eugene W. Skinner, chairman of the department of dental materials of Northwestern University Dental School, will teach. The course is designed to present the practicing dentist with criteria for the selection of dental materials and to provide him with basic information necessary for the proper use of these materials.

THIRTEEN STORY BUILDING PLANNED FOR PITTSBURGH

A 13 story, T-shaped building to be completed in 1956 is planned for the Schools of the Health Professions at the University of Pittsburgh in Pennsylvania. One of the schools to be housed in the new structure is the School of Dentistry. The building has been designed to provide flexibility and economy of space. It has movable internal walls to permit utiliza-



The School of Dentistry of the University of Pittsburgh will be housed in the Schools of the Health Professions Building scheduled for completion in 1956.

tion of space in units of varying sizes, adjustable to the changing needs of the different departments.

Entrances are on three levels. There are ten-story wings, a five-story auditorium and direct connections to three of eight hospitals affiliated with the University's medical program. In the 550,000 square feet of the structure's floor space will be teaching and research facilities, a student center, library and office space. Provision has been made for an anticipated annual enrollment of 2,000 students in the Schools of Medicine, Pharmacy and Dentistry. The School of Dentistry at present has an enrollment of nearly 400.

TO BUILD ADDITION TO SOUTHERN CALIFORNIA SCHOOL

Plans to build a $130,000 addition to the University of Southern California School of Dentistry building in Los Angeles were announced December 8 at a charter dinner of the Century Club, a new organization designed to advance dentistry through the California dental school. The addition to the building will house lecture rooms and research facilities and will be equipped through donations from Century Club members. The building will contain 8,000 square feet of floor space. The site will be cleared shortly.

SCHOOL TO PIONEER IN ATOMIC DENTAL RESEARCH

Dental research with atomic products will start at the University of Southern California School of Dentistry in the fall. The pioneering work in this field has been made possible by a gift of $28,900 from the Los Angeles County Dental Society.

The check was presented to Dean Robert W. McNulty by society president Howard V. Jones.

William Ward Wainwright, head of the school's department of oral diagnosis, will direct the dental isotope research laboratory. A more complete understanding of why teeth decay is expected to be gained. New filling materials may be de-

veloped also. Tracer work will be done with a variety of radioactive substances including tritium, sulfur, carbon and phosphorus.

Public Health

OREGON AND NEW YORK REPORT PROFLUORIDATION ACTION

Action favorable to fluoridation was reported last month from the West and East coasts. In Oregon, the state Supreme Court January 11 upheld the right of the city of Bend to fluoridate its water supply. The city's attempt had been challenged on the grounds of infringement of religious freedom.

Several cities in the state had delayed inauguration of the health measure pending the court decision.

On the East coast, in New York City, the Board of Health fluoridation report was delivered to the city's mayor. The 52 page report gave unqualified approval to fluoridation. It described the procedure as a "health bargain" that would save New Yorkers substantial amounts of the $100,000,000 a year they now spend for dental care.

"The overwhelming weight of competent scientific opinion in the country and in New York City is that water fluoridation is an effective, safe, practical and much needed public health procedure," the report said.

Commenting editorially on the Board of Health action, the *New York Times* stated, "Now we have it, official, authoritative, authentic, ready for City Hall to take action . . . with this logical, persuasive, candid report in hand, the city administration will have a hard time defending further delay." Late in December, Assemblyman Frank S. Samansky, Brooklyn Democrat, announced he would introduce a measure in the state legislature to provide for compulsory fluoridation of all public water supplies in the state.

Across the nation, 1,127 communities with a population of 22,153,617, were drinking fluoridated water as 1956 got under way. And an additional organization added its name to supporters of the measure. The new combined AFL-CIO at its first convention announced its endorsement of the procedure.

PREPARE FOR STUDY ON EFFECT OF CHICAGO FLUORIDATION

The Chicago Dental Society took steps in December to begin a study of the effects of fluoridation of the city's water supplies. In cooperation with the city Board of Education and the city and state health departments, it circulated 25,000 questionnaires to school children and their parents in order to get a list of 8,000 youngsters willing to take part in the study. The children will receive complete dental examinations prior to the institution of the health measure and will be examined again in three years to see what effects consumption of fluoridated water has had. Fluoridation is scheduled to begin in the city February 1. John C. Bergmann, chief dental officer of the city's board of health, will direct the survey.

Meanwhile, Mayor Richard Daley upped the city's school dental budget. Calling the dental program "one of the most deserving projects in the entire budget," the mayor added $50,000 to the original figure for a total appropriation of $140,000. The step was taken, the mayor said, because dental authorities had called to his attention an alarming increase in tooth decay among school children. The effects of the fluoridation program will not be apparent for several years, he pointed out.

DENTIST NAMED TO APHA COMMITTEE ON EDUCATION

Philip E. Blackerby, Jr., a member of the American Dental Association's Council on Dental Education, has been appointed chairman of the American Public Health Association's committee on professional education. Dr. Blackerby is the first dentist to serve on this committee. The APHA committee has responsibility for developing educational standards and for accrediting schools of public health. It is the counterpart in public health of dentistry's Council on Dental Education.

Dr. Blackerby is a past president of the American Association of Public Health Dentists, a past chairman of the APHA's dental health section, and since 1950 has served as secretary-treasurer of the American Board of Dental Public Health. He has served also as consultant to the World Health Organization. He is director of the division of dentistry of the W. K. Kellogg Foundation in Battle Creek, Mich.

Dr. Blackerby's appointment is the second in recent months in which a major post in the APHA has gone to a dentist for the first time. In November, John W. Knutson, chief dental officer of the U.S. Public Health Service, was chosen APHA president-elect, the first dentist to hold that position.

National Defense

RAISE INITIAL RANK FOR MILITARY DENTISTS

In an effort to make military careers more attractive to dentists and physicians, the Air Force and the Army will appoint a dentist to the temporary rank of captain one year after the date of graduation from dental school regardless of the date the dentist enters on active duty; in the Navy, the appointment will be lieutenant. The Department of Defense directive issued in January under which this action was taken also benefits men with additional professional experience. It reduces by one the years of professional experience previously required for initial appointments in grade.

ARMY COMMISSIONS OFFERED TO 655 SENIOR DENTAL STUDENTS

Maj. Gen. Oscar P. Snyder, chief of the Army Dental Corps, has announced that some 655 senior dental students who may be liable for military service under the doctor draft law are being given the opportunity to obtain commissions in the Army Dental Corps immediately after graduation. General Snyder said that early completion of the requirements for such a commission will reduce the possibility that any dentist may be inducted as an enlisted man.

CLARIFY DRAFT POSITION OF RESERVE DENTISTS OVER 40

Paul C. Barton, M.D., executive secretary of the national advisory committee to the Selective Service System, has clarified the policy of the advisory committee regarding dentists 40 years of age and over who have accepted reserve commissions and who wish to continue to delay active duty orders. In a recent letter to the Council on Federal Dental Services, Dr. Barton stated that only those dentists who previously have been classified as essential will be considered for additional postponement of orders.

DENTISTS ASKED TO CONTACT STUDENTS FOR NAVY TRAINING

Civilian dentists who know of high school students desiring to train as dental technicians or in hospital professions are asked to inform students that the Navy

is offering training opportunities. According to a recent announcement, high school students and recent graduates who will enlist in the Regular Navy may be accepted for the Navy dental technician school or the hospital corps school. Full information on the programs may be obtained from any Navy Recruiting Office.

HEALTH PROFESSIONS JOIN IN DEFENSE SYMPOSIUM

Dentists, physicians and veterinarians met in Detroit November 16 for a one day discussion of areas in which they could aid in the event of atomic disaster. High light of the meeting was a symposium sponsored by the state societies of the three professions together with the Michigan Office of Civil Defense and Lederle Laboratories Division, American Cyanamid Company.

Participants in the panel were Max L. Lichter, M.D., codirector of the Detroit Office of Civil Defense and chairman of the Wayne County Medical Society Committee on Civil Defense in Detroit; Russell W. Bunting, dental consultant to the Federal Civil Defense Administration, and C. F. Clark, D.V.M., dean of the College of Veterinary Medicine at Michigan State University.

MILITARY MEDICINE SUBJECT OF SYMPOSIUM

Developments in military medicine and dentistry will be discussed at a March 21-23 symposium for the armed services to be held in Chelsea and Boston. Special emphasis will be placed on atomic warfare, special weapons and isotopes. The first day's meeting is scheduled for the U. S. Naval Hospital in Chelsea; the second and third days for Boston hospitals.

Among prominent speakers will be Frank Berry, M.D., Assistant Secretary of Defense (Health and Medical); Rear Admiral Bartholomew Hogan, (MC) USN, surgeon general of the Navy; Rear Admiral Ralph W. Malone, (DC) USN, chief of the dental division, Bureau of Medicine and Surgery; Brig. Gen. Elbert DeCourney, (MC) USA, commanding officer of the Army Medical Service School; George M. Lyon, (MC) USNR, assistant chief medical director for research and education, Veterans Administration; Charles L. Dunham, M.D., director of the division of biology and medicine, Atomic Energy Commission, and Capt. Shields Warren, (MC) USNR, professor of pathology of the Harvard Medical School.

The meeting has been approved for retirement point credit for those on the active status list.

A finger control water saving device for dental operating units, designed by Cmdr. W. N. Gallagher, (DC) USN, (right) of the U.S. Naval Dental School in Bethesda, Md., is expected to cut the water bill for each dental operating unit about $44 a year. The control device costs $12. The new unit will have especial importance aboard ship where one gallon of fuel oil is required to distill out 25 gallons of fresh water. Here, the annual savings will be nearly $260. The device is composed of magnetic valve, transformer and pendant type electrical control switch attached to the water line supplying the dental cuspidor, aspirator and water tumbler. Lieut. R. R. Troxell, (DC) USN, (left) helped conduct a pilot study on the device.

International

FIRST DENTIST APPOINTED INDIAN ARMY CONSULTANT

Special recognition has been given the dental profession in India with the appointment by Indian president Rajendra Prasad of a civilian dentist as honorary dental consultant to the Armed Forces. N. N. Bery, public relations officer of the All India Dental Association, is the first civilian dentist ever to hold this post. He has been given the rank of colonel.

PUBLISH PRELIMINARY PROGRAM FOR F.D.I. MEETING

Among the topics listed for discussion at the 44th annual meeting of the Fédération Dentaire Internationale are public dental treatment of school age children, the role of the dentist in the armed services, the impact of dental medicine on daily practice and the use of silicates and self-polymerizing resins. According to the preliminary program, these topics will be presented in short lectures and panel discussions. The international meeting will be held in Zurich, Switzerland, May 28 to June 3. Host organization is the Swiss Dental Association.

In addition to the scientific program, an Alpine tour and visits to historic towns and lakes have been planned. There will be a tour of the Benedictine Abbey, the Rhine Falls and the walled town of Stein-am-Rhein.

Dentists planning to attend the meeting should register not later than March 15. A higher registration fee will be charged after the March 15 date. Applications for housing and registration forms may be obtained from R. H. Boitel, secretary of the organizing committee, 41 Talstrasse, Zurich, Switzerland.

PALMA DE MALLORCA SITE OF SPANISH DENTAL CONGRESS

The famous resort island of Palma de Mallorca will be the site of the XVIII Congress of the Spanish Dental Association. The Congress, which will be held May 5-12, will bring together practicing

A modern building is under construction for the medical center of the University of Jerusalem at Ein-Karem. The Dental Institute, part of the University, has been able to admit only 53 students during its first three years of operation. The average age of practicing dentists in Israel is 53 years; the dentist-population ratio 1:1,200; more than half the profession is located in Jerusalem and Tel Aviv.

dentists, dental examiners and dental educators. President of the Congress is Fernando Jaume Torres; the treasurer is Santiago Forteza Forteza. Main speakers will be José F. Rey Forteza, José Reynes Quintana and Antonio Galmes Crespi. Information may be obtained from Dr. Forteza Forteza, Veri, 16, Palma de Mallorca, Spain.

BELGIAN DENTISTS ELECT MARCEL JOACHIM PRESIDENT

The administrative council of the Association Générale des Dentistes de Belgique has named Marcel Joachim president. Other officers of the Association are: Mrs. H. Van Kersschaever and L. Madenspacher, vice-presidents; Chr. Cauchie, general-secretary; A. Kengen, assistant secretary; R. De Vriendt, treasurer; F. Bernier, F. Cauchie, A. Joachim, Fl. Leemans, Jr., J. Lobry, P. Malevez, Ch. Morel, A. Narcisse, R. Prenen, F. Watry and G. Wijnants, members of the council.

LEONARDO MEDEIROS LEADS BOLIVIAN DENTISTS

Leonardo Medeiros Q. has been elected president of the Asociacion Odontologica Boliviana for the 1955-57 term. Guillermo Krutzfeldt is the new vice-president; Armando Saldías Reyes, secretary; Oscar Prudencio, treasurer, and Rosa Elena de Berindoague, Guillermo Ríos and Aldo Cardozo, are voting members of the board.

SUBSCRIPTS • With the December 1955 issue the *Australian Journal of Dentistry* ceased publication to allow the *Australian Dental Journal* to take over. The *Journal of Dentistry* was the second oldest dental journal in the British Commonwealth. . . . According to the Polish newspaper *Trybuna Ludo*, a hopeless fight is going on behind the Iron Curtain to eliminate the unlicensed practice of dentistry. An insufficient number of licensed dentists is at the root of the problem.

Research

USPHS GRANT GOES FOR STUDY OF TOBACCO AND ORAL CANCER

The possible role of tobacco in causing oral cancer will be studied in the Dental School of Northwestern University by J. C. Calandra, M.D., professor and chairman of pathology, and Richard W. Tiecke, associate professor of pathology. The study has been made possible by a research grant of $8,573 from the U.S. Public Health Service.

SCIENTIFIC EXHIBITS A FEATURE OF I.A.D.R. MEETING

Scientific exhibits will be an important new feature of the March 22-24 meeting of the International Association for Dental Research, according to Paul E. Boyle, I.A.D.R. president and professor of oral histology and pathology at the University of Pennsylvania. The meeting will be held at the Hotel Jefferson in St. Louis.

Exhibits will be under the supervision of Reidar F. Sognnaes of the Harvard School of Dental Medicine and Otto W. Brandhorst, a past president of the American Dental Association. Dr. Brandhorst is also chairman of the local arrangements committee.

More than 200 short reports on many phases of dental research will be presented, Dr. Boyle states. Papers will be grouped according to the following section heads: dental caries, fluorides, periodontal disease, saliva and salivary glands, histology, microbiology, anatomy and neoplasms. The dental materials group

will meet March 23-25 for reports on latest developments in restorative materials and technics. A high light of the meeting will be an address by E. V. Cowdry, Ph.D., distinguished anatomist, entitled "Problems of Aging." Dr. Cowdry will speak March 23.

Advance copies of abstracts of the reports are available to those who register prior to February 15. The registration fee of two dollars should be mailed to Dan Y. Burrill, assistant secretary-treasurer, 129 E. Broadway, Louisville, Ky. Undergraduate dental students and families of registrants will be admitted without payment of the registration fee.

HELP! FAIRIES COMPETE WITH RESEARCHERS FOR TEETH

Those invisible winged creatures from the world of fantasy, the fairies, are having a not so invisible effect on the progress of dental research, according to Albert Schatz, director of research at the National Agricultural College in Bucks County, Pa. Dr. Schatz has been trying to obtain deciduous teeth for use in a study of enamel keratin. The study is financed by a grant from the National Institute of Dental Research.

Dr. Schatz is experiencing considerable difficulty in obtaining teeth. Many of the schools and clinics to which he has written for help have replied that such teeth are difficult to get. A major reason, Dr. Schatz says, is that children do not want to surrender their teeth. "Those we have gotten," writes one school, "were obtained only after our nurse wrote a note to the fairy explaining what happened to the tooth. What the ultimate outcome will be we do not know."

Dentists who can supply deciduous teeth to Dr. Schatz are asked to send them to him at the National Agricultural College, Farm School P.O., Bucks County, Pa. Teeth should be air-dried at room temperature. Both intact and carious teeth are suitable.

General

PROGRAM COMPLETED FOR BERKSHIRE CONFERENCE

Four days of lectures, seminars and panel discussions are planned for the seventh annual Berkshire Conference in Oral Pathology and Periodontology June 17-21 at Eastover in Lenox, Mass. Among the subjects to be discussed are the current status of radioactive isotope research, its clinical implications in caries and periodontal disease; clinical application of nutritional therapy; the effects of atomic radiation on the body, and bioanatomical considerations of occlusion.

In addition, the conferees will consider anatomic factors influencing the effect of local anesthetics; aspects of the periodontium which pertain to the construction of prostheses, and the design of removable prosthetic appliances and their use in the management of periodontal disease.

On the faculty for the Berkshire meeting are Reidar F. Sognnaes; Samuel Dreizen; Irving Glickman; Joseph Bernier; Harry Sicher, M.D.; Samuel Pruzansky; Samuel Harris, Ph.D.; Donald Kerr, and Raymond L. Girardot. Additional information on the meeting may be obtained from the Conference, Tufts University School of Dental Medicine, 136 Harrison Ave., Boston.

EASTMAN CLINIC ANNOUNCES POSTS FOR INTERNS, FELLOWS

Positions beginning September 1956 are available for interns and Fellows at the Eastman Dental Dispensary in Rochester, N. Y. Applications are now being considered. The Eastman program currently offers additional incentives to interns who qualify.

During the first year of appointment, expense-paid attendance at a dental meeting of choice is offered two interns. One recipient is chosen by his fellow in-

terns, and the other is selected by the supervisory staff. Part-time opportunities for special clinical activities and research or registration for the Master of Science degree also are available during the first year.

At the end of one year, three salaried appointments for six months in the Eastman dental clinics in London, Paris, Rome, Stockholm or Brussels are available as well as five fellowship appointments for an 18 month diploma or a two year degree course in orthodontics. Additional appointments lead to specialization in pedodontics or research.

SUPERMAN TELLS CARE OF TEETH THROUGH HISTORY

The February issue of *Superman*, published by National Comics Publications, Inc., includes a public service article on dental health. The article, prepared in cooperation with the American Dental Association, outlines a basic program of preventive dental health procedures and traces the care of the teeth from ancient times to the present. *Superman* has an estimated readership of five to six million.

A.M.A. DISCONTINUES USE OF SEAL OF ACCEPTANCE

Attention of the dental profession has been called to the discontinuance last February of the American Medical Association's Seal of Acceptance programs. The Seal of Acceptance programs were discontinued, the A.M.A. reports, in favor of expanding other activities of the A.M.A. councils. Drug manufacturers were advised to discontinue use of the seals no later than August of last year, but a few firms are still advertising to the dental profession that their products have been awarded the A.M.A. seal.

The A.M.A. councils formerly involved in the Seal of Acceptance programs will devote more time to issuing reports promptly on new developments in diagnostic, curative and preventive medicine. They will continue to evaluate, but not endorse, new drugs available to the profession. Advertising standards for the *Journal of the American Medical Association* will not be lowered, the A.M.A. states.

MOTT FOUNDATION OFFERS FELLOWSHIPS IN PEDODONTICS

Two fellowships in graduate dentistry for children are offered by the Charles Stewart Mott Foundation of Flint, Mich. Each fellowship provides for 17 months of formal graduate study at the W. K. Kellogg Foundation Institute of Graduate and Postgraduate Dentistry at the University of Michigan in Ann Arbor and for a year of clinical experience at the Children's Clinic at Hurley Hospital.

During the period at the University, tuition is paid as well as a stipend of $150 a month. In the year of hospital practice, the stipend is $4,400. A program of research may be completed at the Children's Clinic and reported in a thesis. Sufficient operative experience and knowledge of pediatric problems can be obtained to qualify the candidate for a Master's degree in pedodontics.

Additional information on the fellowships may be obtained from Kenneth A. Easlick, professor of dentistry, School of Dentistry, University of Michigan in Ann Arbor. Fellows will be selected in May. The study program begins in September.

INDIANA FOUNDATION SEEKS FLUORIDE TOOTHPASTE PATENT

The Indiana University Foundation has announced the filing of patent applications in the United States and 16 other countries to cover the use of a newly developed stannous fluoride formula in the manufacture of toothpaste. Procter and Gamble will market the dentifrice.

In a statement announcing the filing of patent applications, George F. Heighway, executive secretary of the Foundation, stated that the formula was developed by Indiana University Research supported by grants from Procter and Gamble. The researchers were Joseph C. Muhler of the School of Dentistry; Harry G. Day, chairman, and William H. Nebergall of the department of chemistry.

"The licensing contract provides for the payment of royalties to the Foundation," Mr. Heighway said. "These royalty funds will be used unrestrictedly for scientific research at Indiana University."

According to the November 13 report in the *Chicago Sun-Times,* the Foundation expects eventually to receive royalties of $50,000 a year from the new commercial toothpaste. The Foundation is a nonprofit corporation which administers gifts, grants, patent and royalty funds for educational purposes.

Dr. Muhler has reported previously on a study which showed that a dentifrice containing stannous fluoride reduced tooth decay 50 per cent after children had used it for one year.

INTERNSHIP, RESIDENCIES OPEN AT TWO HOSPITALS

Residencies and an internship are available at two hospitals. Sinai Hospital of Detroit, a 225 bed teaching hospital, offers a one year rotating dental internship. The VA hospital in Wood, Wis., in conjunction with the medical and dental schools of Marquette University, offers a two year residency in prosthodontics and a two year residency in periodontics.

Both residencies are available July 1. A one year internship is a requisite for admission. Further information may be obtained from the hospital. The internship at Sinai Hospital pays a stipend of $225 a month plus room and board.

SYMPOSIUM TO HIGHLIGHT PATHOLOGY MEETING

Tumors of the soft parts of the oral cavity is the subject of a symposium planned as a feature of the April 8 and 9 meeting of the American Academy of Oral Pathology. The Academy's annual session, which will be held the first day of the meeting, is scheduled for the Hotel Woodner in Washington, D.C. The April 9 symposium will be at the Armed Forces Institute of Pathology. Arthur Purdy Stout is moderator.

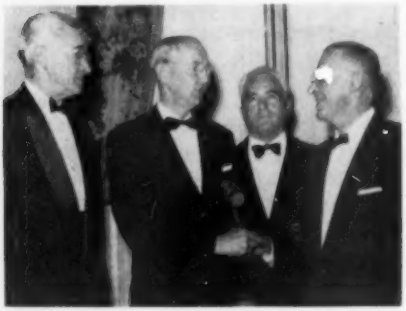
On April 7, the Academy will conduct its Fellowship examination at the Armed Forces Institute of Pathology. Information on the examination as well as on the meeting may be obtained from Col. Joseph L. Bernier, Armed Forces Institute of Pathology, Washington 25, D.C.

JULY 1 IS DEADLINE FOR BOARD OF PATHOLOGY EXAM

July 1 is the deadline by which applications must be completed for the next certification examination of the American Board of Oral Pathology. The examination will be held December 8 and 9 in Washington, D. C. Application blanks and information pertaining to the examination may be obtained from the secretary, Donald A. Kerr, University of Michigan School of Dentistry, Ann Arbor, Mich.

DENTISTS ASKED TO JOIN CRUSADE FOR FREEDOM

All Association members have been asked to support the Crusade for Freedom on behalf of Radio Free Europe. As part of the 1956 drive, dentists are asked to sign a "Freedom Scroll" and to circulate it among their patients. Radio Free Europe, operated by private citizens, broadcasts to Poland, Czechoslovakia, Hungary, Romania and Bulgaria. Scrolls may be obtained from the Crusade for Freedom, Inc., 345 E. 46 St., New York.



A gavel made of wood from Connecticut's historic Charter Oak was presented December 10 to the Horace Wells Club of Connecticut by a descendant of the man who chopped the oak tree down. At the presentation were (l. to r.): Alan L. MacDonald, vice-president; William F. O'Meara, president; Eugene M. Clifford, secretary-treasurer, and John Eric Barker, the donor.

GAVEL MADE FROM FAMOUS WOOD GIVEN WELLS CLUB

A gavel made of wood from Connecticut's historic Charter Oak was presented to the Horace Wells Club of Connecticut December 10. The donor was John Eric Barker, a descendant of the man who chopped the oak down. The Horace Wells club was organized to commemorate the discovery of anesthesia in 1844 by Dr. Wells.

The Charter Oak dates from 1687. In that year, according to the tradition, colonial governor Edmund Andros demanded that Connecticut surrender the charter given it by the King, a document which contained the rights and privileges belonging to the colony. To foil the governor, the charter was hidden in the hollow of an oak tree in the city of Hartford.

The Charter Oak, as it became known, was cut down in 1856 by Mr. John Calvin Barker, a lumberman. Parts of the tree were saved and passed down to Mr. Barker's family. Barker's son, J. Tenney Barker, studied dentistry and was one of the original members of the Horace Wells Club. His son, also a dentist, presented the gavel to the Club.

Also • The New Jersey State Board of Registration and Examination in Dentistry announces a new requirement. Beginning with the June examination, the examiner may at his discretion require the insertion of a gold foil filling in place of either the gold inlay or the amalgam filling. . . . Northwestern University dental alumni meet February 8 at the Conrad Hilton Hotel in Chicago. . . . In March, the American Society for the Advancement of General Anesthesia in Dentistry will hold a scientific program. The date is March 26. . . . April meetings include the American Board of Oral Surgery in Chicago April 7-10; the American Association of Industrial Dentists in Philadelphia April 24-26, and the American Association of Orthodontists in Boston April 29 to May 3. . . . The College of Dentistry, Ohio State University, announces its annual Postcollege Assembly April 18 and 19. . . . Sigma Epsilon Delta December 7 paid tribute to Harry J. Frank of Philadelphia, a member of its Grand Council for 25 years. . . . The Dental Society of the State of New York gave a scroll of appreciation to Alfred W. McCann, Jr. Mr. McCann and his wife Dora have for the past ten years presented at least one dental health education message a week on their daily radio program.

The Reader Comments

THE JOURNAL *devotes this section to comment by readers on topics of current interest to dentistry. The editor reserves the right to edit all communications to fit available space and requires that all letters be signed. At the request of the author, signatures will be deleted before publication. Printed communications do not necessarily reflect the opinion or official policy of the Association. Your participation in this section is invited.*
The Editor

OBJECTS TO O.A.S.I. EDITORIAL

The *J.A.D.A.* December O.A.S.I. editorial is the weirdest two paragraphs of journalism I have read in a long time. The House of Delegates' decision approving voluntary inclusion of dentists in the O.A.S.I. program it says "was taken in accord with the highest democratic traditions, and consistent with these, the present policy should have the united support of the membership. To do otherwise is to discard the democratic process in favor of rump groups and other special pleaders with the resultant high cost in terms of the unity of the dental profession when speaking on matters of legislative interest."

I sat in on the voting on this issue in San Francisco, and I can testify that a small body of willful men frustrated "democratic traditions," the recommendations of the Reference Committee on Insurance and the wish of the large majority of the Association's membership.

Two votes showed the House approved compulsory O.A.S.I. It voted to rescind the Association's opposition policy to O.A.S.I. and defeated the motion to table the Reference Committee recommendation to approve compulsory coverage. What rammed "voluntary" down the Association's throat was a simple parliamentary device of substitute motion.

This succeeded in taking the American Dental Association off one hot spot and placing it squarely upon another hot spot. Else why ask the membership to save face for the Association by abrogating its personal right to think and charging the members in advance with creating disunity in the profession if they exercise their inherent rights as Americans to dissent? Since when did disagreement become tantamount to discarding "the democratic process?"

The Board of Governors of the Dental Society of the State of New York in December reaffirmed its stand for compulsory O.A.S.I. At the Greater New York Dental Meeting at the Hotel Statler December 5, in the presence of Dr. Kingsbury and Dr. Hillenbrand, president and secretary of the American Dental Association, Ormonde J. McCormack, president of the Dental Society of the State of New York, advised New York dentists to write their Congressmen and tell them how they think about the O.A.S.I. issue.

I am certain the Dental Society of the State of New York is not a rump group, nor is Dr. McCormack a member of a rump group. They are trying, I think, to implement the mandate of their constituents in accordance with "the highest democratic traditions."

Happily, in the free world, the blessed rights to think and dissent cannot be editorialized out of existence.

Nathan Kobrin, Brooklyn

FLUORIDE DENTIFRICES

The addendum to the article by Muhler and others in the November issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, page 556, gives the impression that Shaw, Wellock and Bibby concluded that a sodium fluoride dentifrice had no value in the prevention of dental caries. This is not the case.

The table, which is the source of Muhler's information, presents evidence also of a 20 per cent reduction in new cavities after use of a sodium fluoride dentifrice. The conclusions that we drew from the conflicting results were (a) that clinical studies need repeated confirmation and (b) that no therapeutic dentifrice works unless it is placed on the toothbrush and used in the mouth. This conclusion is not in conflict with my present opinions that a sodium fluoride, other fluorides or other agents which react with the tooth surface,

when suitably combined in dentifrices, should be effective in combating dental decay.

Beyond that, it should be pointed out that the use of an addendum to quote unpublished material is an indirect and unusual way of presenting scientific evidence. Such an indirect quotation generally is reserved for those who are dead or residing behind the Iron Curtain and certainly is not justified when the authors of the unpublished material are available for direct consultation. The method of quotation is sufficiently unusual, particularly when coupled with failure to quote opposing evidence from the same source, to suggest that the authors' concern for the promotion of an idea (or even a product) had taken precedence over the establishment of scientific fact.

Basil G. Bibby, D.M.D., Rochester, N. Y.

DR. RADIKE COMMENTS ON DR. BIBBY'S LETTER

The following data are needed to round out the information relative to clinical tests with sodium fluoride in a dentifrice. All of these studies were supported by Procter & Gamble, and, therefore, I am able to give a detailed summary of the results.

In 1942 a clinical test, under the direction of B. G. Bibby, was conducted among orphanage children 4 to 16 years of age and among dental students. In all of these studies the group was divided approximately in half, half using the fluoride dentifrice and half using a control dentifrice.

During the first year, 69 children using a dentifrice (Teel) containing 0.01 per cent sodium fluoride showed a 23 per cent increase in caries. During the second year, the concentration of sodium fluoride was raised to 0.1 per cent, and the group showed a 17 per cent reduction in caries.

The 48 dental students using a 0.01 per cent sodium fluoride tooth paste during the first year showed an 8 per cent increase in dental caries. When using a 0.1 per cent concentration during the second year, they showed a 20 per cent increase in caries. Another group of dental students using sodium fluoride in Teel showed a 12 per cent increase in caries the first year and a 14 per cent increase in caries the second year.

In 1946 a second test was started under the direction of B. G. Bibby and W. D. Wellock among school children 9 to 14 years of age. At the end of one year, 122 children who used a 0.1 per cent sodium fluoride tooth paste showed a 23 per cent reduction in dental caries and at the end of the second year showed a 6 per cent reduction.

None of these results, ranging from a 23 per cent reduction to a 23 per cent increase in caries, were statistically significant. At this point representatives from the Procter & Gamble Company along with B. G. Bibby, W. D. Wellock and R. S. Manly of Boston and Rochester decided that a large-scale clinical test of a sodium fluoride dentifrice was indicated in order to prove definitely whether or not sodium fluoride is effective when used in this way. It was expected that results of such a study would resolve the doubt raised by the inconclusive results obtained previously.

In 1948, a test was started under the direction of W. D. Wellock with about 2,000 school children 7 to 13 years of age. At the end of one year, 946 children who used a 0.1 sodium fluoride tooth paste showed a 9 per cent increase in caries as compared to the caries of 969 children who used a control paste.

The results of this large-scale test, which I believe was well conducted, are the most important results available to date for a sodium fluoride dentifrice. We have requested that these results be published in detail, but the investigators have not yet done so.

The reference by B. G. Bibby to the negative result of this test in the American Association for the Advancement of Science publication, *Fluoridation as a Public Health Measure,* is the only published mention of this test of which I am aware. It was added, therefore, as an addendum to the Muhler article in J.A.D.A. 51:559 November 1955.

We did not consider it important to review the other five prior test results in this same article because they all represent small-scale clinical tests by B. G. Bibby and others in which the investigators failed in every instance to show a significant difference between experimental and control dentifrices.

The conclusion indicated by all the sodium fluoride dentifrice tests summarized by B. G. Bibby in the AAAS publication must be that a significant reduction in dental caries through the use of a sodium fluoride dentifrice has never been demonstrated. This is precisely the tone of the addendum in Muhler's article to which Dr. Bibby seems to object.

I might add that we have spent many months analyzing the sodium fluoride dentifrice data summarized by Dr. Bibby, and I am confident that our statements indicate the proper conclusion from these studies.

A. W. Radike, D.D.S., Drug Products Division, The Procter & Gamble Company

Book Reviews

BIOLOGIE DER PULPA DES MENSCHLICHEN ZAHNES: NEUE FORSCHUNGSERGEBNISSE ALS BEITRAG ZUR THERAPIE DER KARIES UND PARADENTITIS (BIOLOGY OF THE PULP OF HUMAN TEETH: RESULTS OF RECENT RESEARCH: A CONTRIBUTION TO THE THERAPY OF CARIES AND PERIODONTITIS)

By Prof. Guido Fischer, M.D. 142 pages with 144 illustrations (3 colored). 22.40 D.M. Leipzig, Johann Ambrosius Barth, 1955.

The author offers a summary of new research in the therapy of caries and periodontitis and pays special attention to the use of biological methods as an "indirect approach." His narrative is valuable because it presents detailed records of experiments executed at the dental institutes of the universities of Greifswald, Marburg and Hamburg. Significant improvements made in the past decade are clearly explained. The chapters devoted to the rudiments, synthesis, countenance and essential condition of the pulp are noteworthy.

The book is printed on good paper with legible type, all illustrations and drawings are excellent; the binding, however, is poor. Perhaps as important as any other detail is the fact that the book is carefully documented with an extensive bibliography. It is recommended to any practicing dentist who can read German and who wants a brief but satisfactory summary of present knowledge of the biology of the pulp and its influence on the therapy of dental caries and periodontitis.

Paul H. Glucksman

FORTSCHRITTE DER KIEFER- UND GESICHTS-CHIRURGIE: EIN JAHRBUCH, BAND I. (ADVANCES IN MAXILLO-FACIAL SURGERY: A YEARBOOK, VOLUME I)

Edited by K. Schuchardt and W. Wassmund. 259 pages with 372 illustrations. 48 DM. Stuttgart, Georg Thieme, 1955.

This volume contains a collection of lectures on oral surgery and orthodontics by 55 distinguished German and European authorities. These scientists have combined in their contributions the skill of both the basic dental sciences and clinical research. The lectures display a panorama of objectives and achievements; all the papers are immensely useful, practical and informative. The degree of this book's value will of course depend on the use that the reader makes of the material offered.

Unfortunately, neither bibliography nor index is present; both could make this book more valuable. The illustrations are well chosen and clear; the binding is adequate and the type excellent. The material presented will be of value not only to the limited group for whom it was written but to all who are interested in the advances made by recent methods of research.

Paul H. Glucksman

BASIC PRINCIPLES OF PARLIAMENTARY LAW AND PROTOCOL

By Marguerite Grumme. 68 pages. $1. St. Louis, Marguerite Grumme, 1955.

Concerned with more important tasks, few of us are sufficiently familiar with parliamentary procedure under which meetings of clubs and organizations are conducted. It is important, however, that we as citizens and as members of organizations appreciate and understand the basic rules of procedure in order that we may participate effectively in the policy decisions of these groups.

This handy booklet, written by an outstanding authority on parliamentary procedure, supplies a long existent need. Designed for laymen, it is a short, simple book, unburdened by the technicalities so often found in publications of this kind. Within the scope of 68 short pages and utilizing an effective outline, the author spells out the basic fundamentals of parliamentary procedure that a member of an organization such as a dental society might need to know.

The booklet is so constructed that instant referrals can be made to these rules during the course of a meeting. In addition, the booklet contains a chart of basic motions which tells at a glance the priority of the motion and the manner in which it must be handled. The author presents a wealth of information and experience on convention agendas, programs and protocol, as well as advice on other subjects which is much needed during the course of a meeting. This booklet should be read and kept for reference by every active member of organized dentistry.

Howard Greenblatt

A METHOD OF BALANCED ANESTHESIA IN GENERAL SURGERY, OBSTETRICS, AND DENTISTRY

By Sylvan M. Shane, D.D.S., and Harry Ashman, M.D. 53 pages with 2 illustrations. Bibliography. Price $2.25. Baltimore, Lowry & Volz, 1955.

The subject of this book is an important one because the use of several agents instead of one is common practice in present day anesthesia. The term balanced anesthesia is applied to this technic, a technic which developed as the natural outgrowth of the need to supplement intravenous barbiturate anesthesia. The book contains a detailed description of one method of balanced anesthesia which the authors presented in the June and September 1954 issues of the *International Journal of Anesthesia.*

The method described by the authors and referred to as the "S-A Method" consists of induction of anesthesia with an intravenous barbiturate and maintenance by inhalation of an exact mixture of oxygen, nitrous oxide and cyclopropane in a semiclosed system. This sequence is in common use, and the technic of the authors differs only in their concept that the same proportion of gases is applicable to all types of patients and operations.

The text of the book and the fact that the content was first published in an anesthesia journal indicate that it is written for the reader who has had some training in anesthesia technics. Three pages are devoted to the use of the S-A Method in obstetrics and four to its use in dentistry. The technic of intubation of the trachea is discussed briefly. Eight case reports are presented to illustrate the value of the method, and there is a bibliography of 17 references.

The paper and binding are good, and the type size and style contribute to readability. The authors' style of writing is easy to read, but the repeated extolling of the virtues of their method and the quoting of testimonials is not in the best tradition of scientific writing.

Warren R. Schram

KLINISCHE FEHLDIAGNOSEN (INCORRECT CLINICAL DIAGNOSES)

By Prof. M. Bürger. Second edition. 550 pages with 254 illustrations (some in color). Index. 59.40 DM. Stuttgart, Georg Thieme, 1954.

Few books may be considered more timely than this work. The problem of making a correct diagnosis is as important for the medical profession as it is for the dental profession. Although the author's observations cover the area of medicine, they touch and often enter the field of dentistry. The terminology sometimes is confusing because the author makes up Latin and ironical terms. The illustrations are plentiful and excellent, the bibliography (in the text of each chapter) is extensive and complete, and the index of correct and incorrect diagnoses, as well as the general index, are of great assistance to the reader.

Paul H. Glucksman

DENTISTRY

Vocational and Professional Monographs, No. 9. 19 pages. $1. Cambridge, Mass., Bellman Publishing Co., 1955.

This monograph is one of a series of commercially published volumes on vocations and professions and is intended for use by both counselors and students. It considers for dentistry such topics as the supply of dentists, training required, cost of training, licensure, specialization, earnings and opportunities for advancement. It presents factual information and statistics from a number of authoritative sources, which have some general value as resource material for counselors.

In a section on the requirements for admission to the study of dentistry, the author has given information on the predental college requirements, but he has failed to mention the requirement of the American Dental Association's dental aptitude tests. Since all the dental schools now require that applicants take these tests and have the test scores reported to the school as part of the admission procedure, it would seem to be an important point with which both the counselor and the student should be familiar.

With the importance of specialization in dentistry, it seems strange that the author has not included a reference to the list of the specialties now recognized by the American Dental Association.

The author has given little attention to the dental health team and, although some reference is made to dental hygiene, there is no mention of the professional people who work with the dentist.

Brochures for recruiting more qualified dental students are needed by the profession, and the author is to be complimented on adding another to the list of those already available. As so many counselors recognize, a complete library of source books is needed to do a job, and this book is a contribution to the literature in this field.

Samuel T. Mayo

ORAL AND DENTAL DIAGNOSIS WITH SUGGESTIONS FOR TREATMENT

By Kurt H. Thoma, D.M.D., and Hamilton B. G. Robinson, D.D.S., M.S. Fourth edition. 449 pages with 928 illustrations, 55 in color. Index. $10.50. Philadelphia, W. B. Saunders Co., 1955.

This book is designed as a textbook for dental students and as a reference for the practicing dentist. It is divided into two parts. Part I is concerned primarily with treatment planning, history taking and descriptions of various tests which may be pertinent. For example, there is detailed information on the method employed in blood studies and an excellent discussion on roentgenographic technic and the evaluation of roentgenograms. The remaining portion of the book, Part II, deals with special diagnoses of dental and oral diseases and contains suggestions for treatment procedures.

The book is profusely illustrated. The illustrations in the main are excellent and informative. The 55 which are in color are well reproduced. The binding, printing and paper are good.

The book is well organized and should be an effective text book for dental students. The change in the dentist's responsibility to his patient is stated in the opening paragraph. "The traditional training of a dentist, which has been broadened in recent years by the adoption of a firmer foundation in the basic sciences and a realization of their application in oral health and disease, has led to a greater responsibility in the field of oral diagnosis." This book should be of real value in helping the practicing dentist meet this responsibility.

Warren R. Schram

DIE WURZELSPITZENRESEKTION ALS SANIERUNGSMASSNAHME

By Joseph Koch-Langentreu. Second edition. 90 pages with 82 illustrations. 9 DM. Vienna, Austria, Urban & Schwarzenberg, 1954.

Joseph Koch-Langentreu's second edition of his *The Root Resection, a Method of Restoration* happens to be published just in time to commemorate the 100th birthday of Carl Partsch, the Breslau oral surgeon who, in 1896, introduced this operative procedure.

The first part of the book stresses the importance of the doctrine of focal infection and the influence of that doctrine on the status of the dentist. The dentist's importance compares favorably with that of the physician's as is clearly demonstrated by the dentist's understanding of the causal relation between diseases of the teeth and diseases of remote parts of the body. The author gives a clear description of the various foci in mouth and jaws and of the method of eliminating those that endanger other parts of the body.

The most effective treatment of periapical diseases of a tooth, if other treatments have been ineffective, is the root resection which the author describes in great detail with instructive illustrations. He deals with the equipment used in this operation, with the indication for the operation, the various kinds of incision for the opening of the field of operation, the evaluation of roentgenograms and, as the most important point for the success of the operation, with the exact filling of the root canal before or during the operation. An extensive bibliography follows each of the two parts of the book.

Curt Proskauer

THE TALLADEGA STORY

By Solon T. Kimball and Marion Pearsall. 259 pages. Appendix. $3.50. University, Ala., University of Alabama Press, 1954.

This is a study of social process in a community conducting a self-survey. Specifically, the citizens of Talladega set out to inventory local health conditions and to implement certain of the recommendations based on the survey results. Establishment of a community council provided a mechanism for defining the problems, for formulating objectives and for determining policy. During the entire two year period, a group of university sociologists served as technical consultants, observing the various activities in order ultimately to derive general principles of community organization.

Consideration is given to the practical difficulties which beset the initiation of a self-survey, as well as to the divergent cultural currents which may threaten its objectives.

To illustrate the manner in which community systems influence a citizen-directed program for community betterment, the monograph deals at length with the committee on dental health, the Negro inventory committee, the committee on industrial health, and a working class neighborhood where several of the Council committees were active. The program of the committee on dental health provides a documentary account of how the water fluoridation proposal, despite its broad support, failed of passage through bureaucratic inertia and the lack of pressure from elected officials.

The unique merit of the self-survey lies in its potentiality for enlisting citizen participa-

tion. The present study, however, provides no answer to the question of how to distribute participation equally through the various social classes. Existing racial and ethnic divisions in Talladega were obstacles to maximum participation. Although the problems considered were of substantial importance to the Negro and the white laborer strata, the planning and most of the activity rested with the upper third income group of the population.

The writing is of a rare order of clarity, and a wealth of useful insights into the identification and solution of community problems is presented. A key strength of the report is the degree to which the authors make the methodological problems understandable and interesting. Community leaders, for whom the book is particularly intended, will surely find in it much that is constructive and helpful.

Samuel S. Herman

DIE GESTALTUNG DER TOTALEN PROTHESE (CONSTRUCTION OF COMPLETE DENTURE PROSTHESIS)

By Carl Hiltebrandt. 72 pages with 34 illustrations. Konstanz, Germany, Zahnärztliche Welt, 1954.

The author contends that a balanced occlusion is a significant factor in the maintenance of denture stability and retention, in the functional efficiency of the prostheses and in the comfort of the patient. He presents numerous methods for obtaining balanced occlusion. The author assumes that most technics are based on chance only and believes it important to bring the scientific approach into dentistry. He states that balanced occlusion is a prerequisite for a successful complete denture. No bibliography or index accompanies this small book; nevertheless it is a good short summary of the subject.

INDEX OF DENTAL AND ADJACENT TOPICS IN MEDICAL AND SURGICAL WORKS BEFORE 1800

By Hedvig Lidforss Strömgren. 256 pages. Library Research Monographs, Vol. 4. Copenhagen, University Library, Scientific and Medical Department.

The Index of Dental and Adjacent Topics is reviewed by J. J. Pindborg in *Tandlaegebladet* 59:632 Sept. 1955. Dr. Pindborg describes how, through a thorough study of the medical and dental literature in the libraries in Berlin, Copenhagen, Gothenburg, Leipzig, Leningrad, London, Lund, Paris, Stockholm, Uppsala and Vienna, the author, Dr. Strömgren, has listed the books which contain descriptions of dental problems and such closely related problems as hemostatics, cranial deformities, rickets, scurvy and diseases of the salivary glands and the tongue.

Included are 1,182 books published prior to 1800. In general, books that deal exclusively with teeth are omitted since these have been well indexed already.

The first part of the book contains an alphabetical list of all registered publications, including author, title, publisher, year and the page numbers, containing information of dental interest. The oldest publication mentioned, dated 1474, is by Bartholomoes Metlinger and is found in the Walleriana Library, Uppsala.

In the second part of the index, the publications are listed according to subject, including the primitive concepts of the Middle Ages such as amulets, witchcraft and worms in the teeth. Thus is displayed a gold mine of information for anybody interested in the classics of dental literature and history.

The index appears as volume four of the University Library's *Library Research Monographs*. It is written in English.

G. Ryge

THE HEALTH OF REGIONVILLE

By Earl Lomon Koos. 177 pages with 21 illustrations. Index. Appendix. $3.25. New York, Columbia University Press, 1954.

The present volume is the report of an inquiry into the hypothesis that health attitudes and practices of a family are related to its position in the social class hierarchy of the community. The study is focused on 500 families, who were divided into three socioeconomic classes and who were interviewed intensively over a period of four years.

It was apparent from the earliest interviews that dentistry occupied a secondary place in regionville's ideas of its health problems. Some 40 per cent of the respondents reported having a family dentist, compared with 64 per cent having a family physician. In addition, the data point to a closer tie between use of the dentist and economic and cultural characteristics than was true of physician utilization. Social class structure was a significant determinant of the types of treatment received. Unskilled workers, for example, reported that 57 per cent of all adult visits to the dentist were for extractions, as contrasted with 12 per cent for the study group as a whole.

The discussion inevitably comes to the question of dental neglect, for which the most

frequently cited reason was lack of funds. The interviewers gained the distinct impression that a shortage of funds was in many instances a rationalization for a family budget in which dental care had lost out to more desired commodities and services.

The author does not pretend to have the answer to the question of why good dental health may be low in the value hierarchy of some families. He observes that such questions can be answered only through research into interpersonal relations of family and dentist, as well as through cultural studies of those groups in a community for whom dental neglect is characteristic. The absence of such information today, however, impairs the effectiveness of the dentist and health educator in their efforts at modifying attitudes toward dental health.

The Health of Regionville is an outstanding example of the application of sociologic concepts and technics to the problems of community and personal health.

Samuel Herman

THE EFFECT OF SUGAR SUPPLEMENTS ON DENTAL CARIES IN CHILDREN

By J. D. King; May Mellanby; H. H. Stones and H. N. Green. Medical Research Council, Special report series No. 288. 55 pages. Appendix. 4 shillings. Bristol, England, John Wright & Sons, Ltd., Stonebridge Press, 1955.

The results of adding a sugar supplement to the routine diet of institutionalized children are reported in this book. The children studied were from three different communities: London, Liverpool, and Sheffield. Their ages ranged from 4 to 14 years. A total of 762 children were observed for one year, 498 for one and a half years and 243 for two years. An effort was made to pair the children, on the basis of age, sex, and caries experience, into control and experimental groups. The sugar consumption of the control group was 11 ounces per week, approximately that of the war years. The experimental groups received approximately 22 ounces per week, equivalent to prewar consumption. The dietary analyses and the data on the incidence, extent, and spread of caries are contained in 28 tables. There are no illustrations.

The book is paper covered and the print fairly easy to read. It will be of interest to those who are concerned with the dietary control of dental caries. The observations, as might be expected, are that the addition of white or brown sugar at mealtime to a basal diet fairly high in sugar produced no significant increase in the caries activity.

It is unfortunate that the results of this investigation permit conclusions that coincide with one's convictions about caries etiology whatever they may be. Some may utilize the results of the study to exonerate sugar as one of the major factors in caries production. Actually the authors do not come to this conclusion.

Robert G. Kesel

BOOKS RECEIVED BUT NOT REVIEWED

DONNE E FANCIULLI . . . MENO FELICI • By Innocenti and Guido Calderoli. 231 pages. Via XX Settembre 79, Bergamo, Italy, 1955.

IL SOTTOSESSO NEI POPOLI SENZA TONSILLE • By Innocenti and Guido Calderoli. 155 pages. Via XX Settembre 79, Bergamo, Italy, 1954.

EVERYTHING AND THE KITCHEN SINK • Crane Company. 160 pages. Farrar, Straus & Cudahy, Inc., New York, 1955.

THE ELIZABETH MC CORMICK MEMORIAL FUND: THE STORY OF FORTY-FIVE YEARS • 56 pages. The Elizabeth McCormick Memorial Fund, 155 E. Ohio St., Chicago, 1954.

DEUTSCHER ZAHNÄRZTEKALENDER 1955 • Compiled by Prof. Dr. med. Dr. med. dent. Ewald Harndt. 371 pages with illustrations. 9.60 DM. Carl Hanser, Leonhard-Eck-Strasse 7, Munich 27, Germany, 1955.

DIE BEHANDLUNG DER PULPAKRANKHEITEN EINST UND JETZT • By Ernst Kraus. 126 pages with illustrations. Lege Artis, Charlottenstrasse 23, Stuttgart S., Germany, 1953.

MANAGEMENT OF ADDICTIONS • Edited by Edward Podolsky, M.D. 413 pages. $7.50. Philosophical Library, Inc., 15 E. 40th St., New York, 1955.

CONCISE DICTIONARY OF AMERICAN LITERATURE • Edited by Robert Fulton Richards. 253 pages with illustrations. $5. Philosophical Library, Inc., 15 E. 40th St., New York, 1955.

SEXUELLE KONSTITUTION, PSYCHOPATHIE, KRIMINALITÄT, GENIE, Band 1 • By Dr. Helene Stourzh-Anderle. 262 pages. $6.25. Wilhelm Maudrich, Spitalgasse 1b, Wien, Austria, 1955.

Current Literature

RUBBER BASE ELASTIC IMPRESSION MATERIALS (A PRELIMINARY NOTE)

Edwin Rosentiel. Brit. D. J. 98:392 June 7, 1955.

The impression material consists of a rubber-latex emulsion which, on addition of a suitable accelerator and after spatulation for 30 to 40 seconds, commences to change from a creamy consistency into a soft resilient rubber. When set, the material is stable for at least several hours. It is insoluble in water, and dies may be made by copper deposition. The strength of the material is superior to that of the hydrocolloids. Elastic recovery appears to be adequate for most impressions.

Preliminary investigation of the dimensional accuracy of models obtained with rubber base impressions is promising. The models possess a degree of dimensional accuracy and working properties sufficient to warrant their use in inlay and in crown and bridge work. Some difficulties which are encountered in the use of hydrocolloids, such as making the material flow into subgingival regions, also occur with the new material. A method which uses a modified copper band enclosed in an impression compound tray is better than that which uses a perforated tray. Adhesion is secured by a perforated band.

Rubber and accelerator paste must be mixed thoroughly. Unmixed portions will spoil parts of the impression. Some manufacturers understate the setting times of the products. At least five minutes should be allowed after the initial hardening has occurred before removal of the impression.

G. M. Brauer

DENTIGEROUS CYST: REPORT OF CASE

Charles A. Wilkie and Sherman E. Gordon. J. Oral Surg. 13:338 Oct. 1955.

An extensive dentigerous cyst involving the mandible of a 58 year old white man was seen. The patient had noted numbness of the left half of the lower lip and chin during the preceding month. Swelling, trismus and fever had been present for four days prior to the first office visit. Roentgenographic examination disclosed a distinctly outlined radiolucent area in the left side of the mandible extending from beneath the roots of the first molar well into the ascending ramus. An unerupted third molar which appeared carious, though deeply imbedded, seemed to be related to the lesion.

The acute infection was treated by incision and drainage and by the administration of tetracycline. One week later, an operation was performed under local anesthesia. An intraoral approach was made by means of an incision along the alveolar ridge extending onto the anterior border of the ascending ramus. The cystic sac was enucleated, and the unerupted third molar and first and second molars were removed. It was noted that the crown of the third molar was actually carious. The inferior alveolar nerve and vessels were found to be displaced inferiorly and lacked a bony roof. Microscopic examination was reported as being consistent with the diagnosis of dentigerous cyst.

The postoperative course was uneventful. Normal sensation returned to the lip and chin within six weeks after the operation.

AN ANALYSIS OF CHANGES IN THE DENTOFACIAL SKELETON FOLLOWING ORTHODONTIC TREATMENT

Coenraad F. A. Moorrees, Tandarts and Peter Kai-Jen Yen. Am. J. Orthodont. 41:526 July 1955.

Changes which occur in the dentofacial skeleton after orthodontic treatment have been studied by means of applying a mesh diagram method to the analysis of four individual patients.

The advantages of the method are: (1) graphic depiction of changes, which facilitates interpretation, (2) elimination or reduction of complications in analysis which arise from increases in the size of the facial skeleton during growth and (3) suitability of the procedure for the study of disproportionate growth changes in parts of the facial skeleton.

The method appears worthy of application to larger bodies of suitable data and may prove helpful in gaining a better understanding of the limitations of different methods of treatment in orthodontics. Such information will aid in the formulation of more realistic objectives and, therefore, can be expected to lead to more efficient treatment planning.

Frequently, treatment objectives are not reached through mechanotherapy. Such failure focuses attention on the limitations of existing therapeutic measures in orthodontics. The analytic method can be used, furthermore,

to study the changes which occur after orthodontic treatment has been completed, and all appliances have been removed. It is known that the results of such treatment are not always of a permanent nature; relapses have been observed by many, if not all, practitioners who have observed their patients for a period of time after treatment.

William F. Ford

A NEW ELASTIC IMPRESSION MATERIAL: A PRELIMINARY REPORT

S. L. Pearson. Brit. D. J. 99:72 Aug. 2, 1955.

The base of a new elastic impression material consists of a liquid polysulfide rubber made into a white paste with an inert filler. The accelerator is principally a brown paste of lead peroxide and a suitable vehicle. Analysis of the material gave the following:

Base	*Per cent*
Polysulfide rubber	79.72
Zinx oxide	4.89
Calcium sulfate	15.39
Accelerator	*Per cent*
Lead peroxide	77.65
Sulfur	3.52
Castor oil	16.84
Other substances	1.99

Mixing is carried out on a glass slab, and the material is spatulated for 30 to 45 seconds. Considerable care and speed are required to obtain a completely homogeneous mix in large quantities. At mouth temperature the material cures in three to four minutes to a tough elastic compound with a smooth surface. The proportions of base and accelerator, mixing time and temperature influence the curing time. Impressions of individual teeth are best made with a perforated stainless steel band since with a copper band there is a tendency for the material to pull away.

Individual tooth impressions may be obtained by use of the described technic. For the taking of an impression of several preparations in one quadrant, the impression can be poured in artificial stone without the need for a separating medium or special treatment and subsequently can be sawed into convenient sections. Copper plating the impression before pouring in stone provides dies with a hard surface on which the castings may be burnished and polished. Little difficulty has been experienced in depositing copper onto the rubber base material. "Aquadap" colloidal graphite must be worked well into all the irregularities of the impression to impart a conducting surface.

The multiple impression is taken either in a relined compound impression made in a stock tray or with a perforated shellac baseplate tray. It is advisable to pour the impression soon after removal from the mouth since the composition will distort over a period of time. In those instances where the gingival margins of cavities extend well below the gingival level, the individual tooth impression technic should be used.

The rubber base impression material gives a sharp, tough, elastic impression with a smooth surface and good accuracy of reproduction. The impression is dimensionally stable and need not be cast immediately. A limited number of inlays and bridges are constructed in the mouth. The one-impression bridge technic is particularly suitable for reconstructing fractured bridges where it is unnecessary to remove one of the retainers and in which a keyway can be cut in the mouth for the reception of a stress breaker.

G. M. Brauer

EXTRAORAL FORCE—FACTS AND FALLACIES

T. M. Graber. Am. J. Orthodont. 41:490 July 1955.

In a study of 150 Class II, Division I, malocclusions, headplates and plaster casts were analyzed. In 107 of these patients the mandibular dentures were essentially normal with respect to arch form, contact relationship, tooth size and position and basal bone relationship. These dentures were in a state of balance that normally would be considered satisfactory. Only when the mandibular casts were related to the maxillary casts was a considerable anteroposterior malrelationship noted.

In order that variables be reduced to a minimum, only one type of cervical gear appliance was used. In the beginning this appliance was to be the only mechanotherapy, but the plan was altered to include the use of some bite plates, lower appliances and elastic traction.

The patients were divided into three age groups: deciduous dentition, 3 to 6 years; mixed dentition, 7 to 10 years; permanent dentition, 11 to 19 years.

It was demonstrated that Class II, Division I, malocclusions are amenable to correction by the use of extraoral force. Considerable improvement in basal relations can be obtained; overbite and overjet problems can be helped greatly.

The initial pattern, the relationship of the dentures and degree of basal malrelationship, overbite and overjet and the unpredictable amount of growth definitely influence the results.

Certain untoward sequelae may result from the use of extraoral force. These include incomplete correction of tooth malrelationship, excessive distal tipping of maxillary first molars, impaction of maxillary second or third molars, excessive lingual tipping of maxillary incisors, unilateral response in correction of Class II relationship and difficulty in the control of excessive overbite.

William F. Ford

THE MESIAL DRIFT OF TEETH DURING GROWTH

Alexander Sved. Am. J. Orthodont. 41: 539 July 1955.

Since the teeth move forward through the bone during growth, a certain amount of this forward movement must be looked on as normal. Although the normal forward growth cannot actually be measured, an approximate idea may be formed of the distance the teeth must move forward.

The ability of the mandible to compensate for differences of growth in the structures included between the glenoid fossa and the upper anterior teeth should be studied carefully.

Everything known about the adaptability of the mandible points to the possibility of the permanent repositioning of the mandible. It is likely that the mandible adjusts itself to major changes in occlusion; it is difficult to believe that the position of the lower jaw is fixed permanently and cannot be changed by orthodontic means. When this point of view is taken into consideration, together with the knowledge that the maxillary teeth move forward regardless of what may be done during treatment, the importance of the distal movement of the maxillary teeth diminishes, while the repositioning of the mandible becomes an important requirement in the successful treatment of Class II, Division I, malocclusions.

William F. Ford

PREVENTIVE DENTISTRY AND PREVENTIVE ORTHODONTICS THROUGH PUBLIC DENTAL HEALTH EDUCATION

Leo B. Lundergan. Am. J. Orthodont. 41:554 July 1955.

Dentistry has made remarkable progress during the past century, especially during the past 25 years. Progress has been made through education, research, legislation, improved materials and technical procedures. Although preventive dentistry has not kept pace with the other branches of dentistry, it is, nevertheless, an essential health service.

The public has not understood the importance of prophylactic care of the deciduous dentition. It has not understood the problems which arise from early loss of deciduous teeth, from neglect of proper space, from failure to replace lost permanent teeth, from prolonged thumbsucking, pressure habits of the tongue and hand, prolonged retention of deciduous teeth and crossbites.

The early recognition of these conditions by dentists and parents could minimize the orthodontic problems of dysfunction of occlusion, disharmony of the face and some of the accompanying nutritional and psychological disturbances.

In a survey of the oral conditions of 103,570 school children in St. Louis the tabulations indicate that 51.9 per cent had some type of dental anomaly.

Dental health programs are most effective in the kindergarten and elementary grades, because of the impressionable age of the pupils. The appeal for better oral health for the high school pupil should be from the psychological approach of improving his appearance. Experience has shown that adult groups are more difficult to reach in health educational programs.

Preventive dentistry and preventive orthodontics, or any specialty of the healing art, can reach the highest degree of development only after the practitioners are able to educate the members of society in such manner as to make it possible for them to understand the importance of prevention.

William F. Ford

Deaths

Allen, Leo M., Kansas City, Mo.; Kansas City-Western Dental College, 1926; died September 23; aged 51.

Allison, Edward G., Fargo, S. D.; Louisville College of Dentistry of Centre College, 1910; died September 9; aged 78.

Alsbach, George C., Ada, Okla.; Kansas City-Western Dental College, 1924; died October 2; aged 55.

Amundsen, Leo, Los Angeles; College of Dentistry, University of Southern California, 1925; died August 14; aged 60.

Appleman, Robert M., Chicago; College of Dentistry, Ohio State University, 1927; died September 25; aged 53.

Armistead, John O., Newman, Calif.; College of Dentistry, University of California, 1917; died August 27; aged 63.

Astry, John W., Salem, Ohio; School of Dentistry, University of Pittsburgh, 1914; died October 8; aged 64.

Ausplund, Emil G., Portland, Ore.; Denver College of Dentistry, 1899; died September 24; aged 80.

Bailey, John W., Wilbraham, Mass.; Boston Dental College, 1890; died August 11; aged 85.

Baird, John W., Council Bluffs, Iowa; College of Dentistry, Creighton University, 1928; died October 5; aged 58.

Baker, Herman R., Upland, Calif.; College of Dentistry, University of Southern California, 1923; died September 9.

Barager, Christopher F., Hazleton, Pa.; School of Dentistry, University of Pennsylvania, 1911; died July 26; aged 70.

Barker, Walter L., Osceola, Mo.; Kansas City-Western Dental College, 1935; died July 28; aged 46.

Barnett, Finis L., Springfield, Mo.; School of Dentistry, Washington University, St. Louis, 1930; died August 29; aged 45.

Barnewolt, Henry F., Pasadena, Calif.; College of Dentistry, University of Southern California, 1919; died August 13; aged 58.

Barngrover, Cecil E., Valley Center, Kan.; Western Dental College, Kansas City, 1919; died September 19; aged 57.

Baronidis, Cedric C., San Francisco; College of Dentistry, University of California, 1918; died in December, 1954; aged 63.

Bawer, Alexander, West Hartford, Conn.; School of Dentistry, Georgetown University, 1921; died July 30; aged 66.

Beaudin, Ernest A., Kalispell, Mont.; College of Dentistry, University of Minnesota, 1927; died October 7; aged 58.

Bedford, Henry D., Easton, Pa.; Philadelphia Dental College, 1899; died June 4; aged 78.

Beers, Clarence E., East Orange, N. J.; College of Dental and Oral Surgery, New York, 1904; died August 11; aged 83.

Bennett, Roy F., Cleveland; Indiana Dental College, 1899; died September 12; aged 80.

Bertram, Carl L., Chicago; Dental School, Northwestern University, 1909; died October 5; aged 72.

Bingman, Harry, Washington, D. C.; Dental Department, George Washington University, 1912; died October 20; aged 75.

Block, David A., Denver; School of Dentistry, University of Denver, 1906; died August 11; aged 73.

Blumberg, Louis, Philadelphia; School of Dentistry, University of Pennsylvania, 1913; died October 3; aged 63.

Bolles, George E., Danbury, Conn.; Philadelphia Dental College, 1903; died September 22; aged 77.

Brewer, Nicholas R., St. Paul; College of Dentistry, University of Minnesota, 1943; died June 27; aged 40.

Brown, Edward G., Harvey, Ill.; Chicago College of Dental Surgery, Loyola University, 1903; died September 16; aged 78.

Brown, William H., Memphis, Tenn.; Dental Department, St. Louis College of Physicians and Surgeons, 1890; died August 25; aged 87.

Buchholz, Otto L., Toledo, Ohio; College of Dentistry, Ohio State University, 1935; died August 6; aged 46.

Burlew, Fountain, Matawan, N. J.; School of Dentistry, University of Pennsylvania, 1919; died July 27; aged 58.

Busch, Ernest, St. Joseph, Mo.; American College of Dental Surgery, Chicago, 1893; died September 6; aged 83.

Butler, George V., Luverne, Minn.; College of Dentistry, University of Minnesota, 1916; died September 15; aged 60.

Cairns, Simon P., Mattapan, Mass.; Baltimore College of Dental Surgery, University of Maryland, 1900; died September 30.

Caramella, Joseph S., San Jose, Calif.; College of Physicians and Surgeons, San Francisco, 1929; died August 30; aged 46.

Challingsworth, William J., Chicago; Chicago College of Dental Surgery, Loyola University, 1926; died September 3; aged 51.

Chan, Lawrence S., Chicago; Dental School, Northwestern University, 1930; died August 30; aged 65.

Charvat, Philip J., Avon Lake, Ohio; College of Dentistry, Western Reserve University, 1942; died August 26; aged 37.

Clark, Charles M., Mount Kisco, N. Y.; Baltimore College of Dental Surgery, 1917; died October 13; aged 61.

Coffman, Clifton S., Lewisburg, W. Va.; Baltimore College of Dental Surgery, University of Maryland, 1906; died September 17; aged 74.

Cohen, Joseph H., Haverhill, Mass.; Dental School, Tufts College, 1915; died September 24; aged 60.

Coleman, Louis P., Sussex, Wis.; Dental School, Northwestern University, 1895; died September 30; aged 85.

Coleman, Oswald P., Madrid, N. Y.; Pennsylvania College of Dental Surgery, Philadelphia, 1902; died August 11; aged 77.

Collings, William F., Valley Station, Ky.; Louisville College of Dentistry of Centre College, 1902; died August 5; aged 93.

Cotter, Harry J., Quincy, Mass.; Baltimore College of Dental Surgery, 1918; died October 12; aged 67.

Covalt, Roy W., Chicago; Dental School, Northwestern University, 1930; died August 11; aged 63.

Crandall, Harris M., Ware, Mass.; Pennsylvania College of Dental Surgery, Philadelphia, 1905; died August 9; aged 72.

Crislip, Chester A., Spencer, W. Va.; Louisville College of Dentistry of Centre College, 1909; died May 12; aged 70.

Crystal, William E., East St. Louis, Ill.; School of Dentistry, St. Louis University, 1928; died July 25; aged 52.

Cushing, Harry H., Framingham, Mass.; Dental School, Harvard University, 1901; died September 7; aged 80.

Cutler, William E., Chanute, Kan.; Kansas City Dental College, 1897; died September 20; aged 82.

Daugherty, John W., Charleston, W. Va.; Louisville College of Dentistry of Centre College, 1918; died August 16; aged 65.

Dean, J. Camp, Oakland, Calif.; College of Dentistry, University of California, 1910; died October 21; aged 76.

Delaney, Raynald J., Hyannis, Mass.; Dental School, Tufts College, 1952; died August 4; aged 30.

Dickson, Walter E., Ingram, Pa.; School of Dentistry, University of Pennsylvania, 1900; died July 28; aged 81.

Dillehay, David W., Seattle; Atlanta Dental College, 1895; died October 14; aged 82.

Dirting, Douglas C., Martinsburg, W. Va.; Dental School, Tufts College, 1943; died August 13; aged 38.

Doe, Adolph C., Chicago; Chicago College of Dental Surgery, Loyola University, 1918; died October 25; aged 60.

Dow, Edmund C., West Concord, Mass.; Dental School, Harvard University, 1918; died July 31; aged 59.

Doyle, Arthur A., New Richland, Minn.; College of Dentistry, Creighton University, 1912; died September 25; aged 68.

Drehmel, William L., Michigan City, Ind.; Ohio College of Dental Surgery, University of Cincinnati, 1918; died September 9; aged 58.

Dreyer, Everett L., Auburn, Neb.; College of Dentistry, Creighton University, 1919; died in August; aged 58.

Dwyer, Horace S., Little Rock, Ark.; College of Dental and Oral Surgery, New York, 1919; died October 20; aged 59.

Edstrom, Eric G., Kansas City, Mo.; died September 1; aged 68.

Ekstrom, Lawrence S., Superior, Wis.; Dental School, Marquette University, 1927; died August 9; aged 53.

Ellerbe, James H., Rockingham, N. C.; Atlanta Dental College, 1917; died September 13; aged 61.

Emerson, Jacob A., Louisville, Ky.; College of Dentistry, Howard University, 1905; died September 30; aged 77.

Faller, Edward G., McHenry, Ill.; Dental School, Northwestern University, 1912; died June 28; aged 67.

Fallis, Robert W., New York; Dental School, Northwestern University, 1904; died August 21; aged 78.

Feltman, William C., Vinton, Ohio; College of Dentistry, Ohio Medical University, 1901; died July 31; aged 79.

Ferguson, William G., Detroit; Department of Dental Surgery, Detroit College of Medicine, 1903; died August 24; aged 74.

Fiegel, David G., St. Petersburg, Fla.; New York College of Dentistry, 1912; died September 27; aged 65.

Finn, William, Pittsburgh; Indiana Dental College, 1889; died September 26; aged 88.

Flanagan, Lawson H., Santa Monica, Calif.; Dental School, Northwestern University, 1900; died October 15; aged 78.

Folkes, Lawrence S., Richmond, Va.; Dental Department, University College of Medicine, Richmond, 1898; died July 4; aged 79.

Ford, W. Hugh, San Angelo, Texas; Texas Dental College, Houston, 1920; died October 8; aged 58.

Frank, Hyman A., New Castle, Pa.; School of Dentistry, University of Pittsburgh, 1915; died June 7; aged 63.

Frayer, Harry C., Milwaukee; Ohio College of Dental Surgery, University of Cincinnati, 1903; died September 20; aged 76.

Friedman, Carl, Hempstead, N. Y.; School of Dental and Oral Surgery, Columbia University, 1924; died September 28; aged 54.

Friesell, Frederick C., Murrysville, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1898; died September 2; aged 88.

Gaff, Oliver J., Chicago; died August 28; aged 65.

Garfield, Joseph L., Philadelphia; School of Dentistry, Temple University, 1931; died August 22; aged 49.

Garnhart, Warren C., Los Angeles; died September 19.

Gayer, Frank A., Le Sueur, Minn.; School of Dentistry, St. Louis University, 1942; died June 29; aged 39.

Gilbride, Roderick F., San Francisco; College of Physicians and Surgeons, San Francisco, 1914; died September 21; aged 61.

Gill, Henry A., Grand Prairie, Texas; College of Dentistry, Baylor University, 1929; died October 13; aged 54.

Gillespie, Roy P., Zanesville, Ohio; College of Dentistry, Ohio Medical University, 1902; died August 12; aged 77.

Gillim, Donald A., Dayton, Ohio; College of Dentistry, Ohio State University, 1923; died October 3; aged 63.

Glocheskie, Harold F., Grand Rapids, Mich.; College of Dental Surgery, University of Michigan, 1931; died July 24; aged 49.

Goldstein, Charles, Pittsburgh; School of Dentistry, University of Pittsburgh, 1923; died September 18; aged 55.

Gould, Fred W., Grants Pass, Ore.; School of Dentistry, North Pacific College of Oregon, Portland, 1929; died September 5; aged 48.

Graham, E. A., Daytona Beach, Fla.; died August 11; aged 67.

Greaser, Arthur D., Vista, Calif.; College of Dentistry, University of Southern California, 1930; died October 17; aged 57.

Green, Ward E., Manchester, Conn.; Philadelphia Dental College, 1909; died August 6; aged 67.

Greenburg, Lee C., Indianapolis; Ohio College of Dental Surgery, University of Cincinnati, 1907; died August 31; aged 72.

Groh, Estelle H., Rochester, N. Y.; School of Dentistry, University of Buffalo, 1919; died July 31; aged 85.

Guptill, Arthur E., Fitchburg, Mass.; Baltimore College of Dental Surgery, 1897; died August 6; aged 82.

Haas, William I., Williamsport, Pa.; School of Dentistry, Temple University, 1930; died July 12; aged 57.

Hammen, Albert E., Jefferson City, Mo.; died September 30; aged 88.

Hand, William L., New Bern, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1905; died September 30; aged 77.

Hankins, William O., Danville, Va.; Dental Department, University College of Medicine, Richmond, 1912; died September 23; aged 67.

Harter, Arthur L., Kokomo, Ind.; Indiana Dental College, 1901; died September 19; aged 80.

Hatfield, Whitton R., White Plains, N. Y.; School of Dentistry, University of Pennsylvania, 1918; died September 6; aged 58.

Hawkes, Louis A., Pittsburgh; Pennsylvania College of Dental Surgery, Philadelphia, 1902; died May 29; aged 70.

Hayden, Frank E., Seattle; School of Dentistry, University of Washington, Seattle, 1951; died September 19; aged 34.

Hayes, William F., Stroudsburg, Pa.; Pennsylvania College of Dental Surgery, Philadelphia, 1898; died September 5; aged 78.

Hays, Samuel M., Bloomfield, Ky.; School of Dentistry, University of Louisville, 1927; died September 23; aged 51.

Heeseman, Gary, Charlotte, N. C.; Baltimore College of Dental Surgery, University of Maryland, 1929; died September 29; aged 49.

Heieck, James A., St. Louis; School of Dentistry, Washington University, St. Louis, 1914; died September 19; aged 62.

Heineke, Gustav, Brenham, Texas; Dental School, Northwestern University, 1917; died September 29; aged 60.

Herd, Dolan F., Sacramento, Calif.; College of Dentistry, University of California, 1914; died October 1; aged 64.

Hick, Thomas A., Miami, Fla.; School of Dentistry, University of Pittsburgh, 1923; died July 28; aged 57.

Highberger, Frederick, Braddock, Pa.; School of Dentistry, University of Pittsburgh, 1920; died August 27; aged 57.

Hines, James F., Perth Amboy, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1918; died August 15; aged 60.

Hocking, William E., Devils Lake, N. D.; Chicago College of Dental Surgery, Loyola University, 1906; died August 14; aged 72.

Holland, Lynwood C., Suffolk, Va.; Baltimore College of Dental Surgery, University of Maryland, 1904; died September 20; aged 73.

Hollowell, Leighton E., Clinton, Iowa; College of Dentistry, University of Iowa, 1922; died September 2; aged 55.

Huber, Rudolph D., New York; School of Dental and Oral Surgery, Columbia University, 1926; died September 22; aged 61.

Hutchinson, Willis J., Ontario, Calif.; College of Dentistry, University of Southern California, 1925; died October 27; aged 53.

Hyndman, Hunter S., Litchfield, Ill.; Missouri Dental College, St. Louis, 1897; died September 24; aged 83.

Jameson, Maxwell L., Burlington, Vt.; Dental School, Harvard University, 1919; died September 15; aged 58.

Johnson, Alfred A., Columbus, Ga.; College of Dentistry, Western Reserve University, 1948; died September 16; aged 41.

Johnson, Norman C., Coleraine, Minn.; Dental School, Northwestern University, 1938; died July 22; aged 42.

Karcher, Paul H., Quincy, Mass.; Dental School, Harvard University, 1918; died September 23; aged 60.

Kenower, Leland A., Milwaukee; Dental School, Marquette University, 1934; died August 14; aged 44.

Kimbell, Will E., Des Moines, Iowa; Dental School, Northwestern University, 1910; died October 5; aged 76.

Klein, Henry M., Syracuse, N. Y.; died August 2; aged 64.

Koonz, Harold A., Jersey City; New York College of Dentistry, 1898; died October 8; aged 77.

Leitz, Harry W., Akron, Ohio; College of Dentistry, Ohio State University, 1907; died August 30; aged 76.

Levy, Walter R., Jackson, Tenn.; School of Dentistry, Vanderbilt University, 1911; died September 26; aged 66.

Lewis, Roland H., Providence, R. I.; Dental School, Tufts College, 1911; died September 24.

Lynn, Robert J., Melrose, Mass.; Dental School, Harvard University, 1928; died October 14; aged 49.

Maffey, Harry A., Cincinnati; Cincinnati College of Dental Surgery, 1902; died July 28; aged 75.

Mann, Robert, Phoenix, Ariz.; College of Dentistry, University of Illinois, 1912; died August 27; aged 76.

Marjerison, Howard M., Boston; Dental School, Tufts College, 1916; died September 4; aged 59.

Markey, John I., Seattle; School of Dentistry, North Pacific College of Oregon, Portland, 1927; died September 19; aged 52.

Matusavage, Paul J., Glen Lyon, Pa.; School of Dentistry, Temple University, 1928; died May 4; aged 50.

McCarthy, Roy H., Renton, Wash.; Louisville College of Dentistry of Centre College, 1917; died October 13; aged 70.

McCarthy, Thomas J., Chicago; Dental School, Northwestern University, 1916; died October 19; aged 63.

McCarthy, Walter J., Youngstown, Ohio; College of Dental Surgery, University of Michigan, 1926; died October 3; aged 53.

McCready, William A., Pittsburgh; Pittsburgh Dental College, Western University of Pennsylvania, 1903; died September 18; aged 78.

McDonald, Lloyd C., Los Angeles; Chicago College of Dental Surgery, Loyola University, 1913; died August 30; aged 62.

McIntosh, William E., Lynchburg, S. C.; Baltimore College of Dental Surgery, University of Maryland, 1913; died October 8; aged 73.

McKinney, Nathan H., Carlisle, Ky.; Department of Dentistry of Central University, Richmond, 1888; died August 3; aged 79.

McMillen, Adrian F., Blossburg, Pa.; School of Dentistry, University of Pittsburgh, 1939; died September 6; aged 45.

Mears, Chester M., Mexico City, Mexico; Atlanta Dental College, 1909; died June 5.

Wieser, Florian J., St. Louis; School of Dentistry, Washington University, St. Louis, 1896; died June 4; aged 83.

Wiesler, Paul R., Milwaukee; Dental School, Marquette University, 1919; died June 29; aged 57.

Wilson, George W., Greenland, Ark.; died July 9; aged 79.

Wipf, Jacob H., Freeman, S. D.; Dental School, Northwestern University, 1907; died June 22; aged 70.

Woods, James P., Monett, Mo.; died April 30; aged 79.

Wright, Melvyn R., Fergus Falls, Minn.; College of Dentistry, University of Minnesota, 1928; died July 11; aged 56.

Yeager, Jesse E., Stuttgart, Ark.; College of Dentistry, Baylor University, 1944; died June 15; aged 34.

Zugsmith, Robert, Pittsburgh; Pittsburgh Dental College, Western University of Pennsylvania, 1903; died May 11; aged 72.

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Orthodontics and Oral Development: George A. Dinham, Medical Arts Bldg., Duluth, Minn.

Pedodontics: Ruth E. Martin, 4559 Scott Ave., St. Louis

Periodontics: Samuel C. Miller, 57 W. 57th St., New York

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Prosthodontics, Complete: Arthur L. Roberts, Aurora National Bank Bldg., Aurora, Ill.

Prosthodontics, Partial: Richard L. Simpson, Medical College of Virginia, Richmond, Va.

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Announcements

MEETINGS OF THE AMERICAN DENTAL ASSOCIATION

Ninety-Seventh Annual Session	Oct. 1-4, 1956	Atlantic City, N. J.
Ninety-Eighth Annual Session	Nov. 4-7, 1957	Miami, Fla.
Ninety-Ninth Annual Session	Nov. 10-13, 1958	Dallas, Texas
One-Hundredth Annual Session	Sept. 21-24, 1959	New York

MEETINGS OF CONSTITUENT SOCIETIES

State	Date	Place	Secretary	Address
Alabama	Apr. 15-17	Biloxi, Miss.	F. A. Finney, Jr.	1045 Forrest Ave., Gadsden
Alaska	Aug. 15-18	Fairbanks	J. L. Irby	1010 Noble St., Fairbanks
Arizona	Apr. 11-14	Tucson	R. W. Christensen	17 E. Weldon Ave., Phoenix
Arkansas	Apr. 8-11	Little Rock	D. M. Hamm	Box 89, Clarksville
California	Apr. 23-25	San Francisco	W. J. Healy	450 Sutter St., San Francisco
S. California	Apr. 30-May 2	Los Angeles	J. P. Bowers	903 Crenshaw Blvd., Los Angeles
Colorado	Oct. 21-24	Colorado Springs	W. R. Humphrey	Republic Bldg., Denver
Connecticut	May 2-4	Hartford	E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			J. C. Gantt	1102 Madison St., Wilmington
District of Columbia	Mar. 11-14	Washington	J. F. Keaveny	1029 Vermont Ave., N.W., Washington
Florida	May 28-30	Miami Beach	W. A. Buhner	167 Broadway, Daytona Beach
Georgia	Oct. 21-24	Savannah	J. W. Yarbrough	Bibb Bldg., Macon
Hawaii	Sept. 10-15	Maui Island	J. H. Dawe	810 N. Vineyard St., Honolulu
Idaho	Sept. 27-29	Sun Valley	D. E. Sonius	125 Fourth Ave., N., Twin Falls
Illinois	May 14-16	Springfield	P. W. Clopper	Jefferson Bldg., Peoria
Indiana	May 21-23	Indianapolis	D. C. Barnhill	Bankers Trust Bldg., Indianapolis
Iowa	May 6-9	Des Moines	H. I. Wilson	Insurance Exchange Bldg., Des Moines
Kansas	May 14-17	Topeka	F. A. Richmond	Brotherhood Bldg., Kansas City
Kentucky	Apr. 8-11	Louisville	A. B. Coxwell, Jr.	1976 Douglass Blvd., Louisville
Louisiana	Apr. 11-14	Alexandria	J. S. Bernhard	2515 Line Ave., Shreveport
Maine	June 21-23	Rockland	S. M. Gower	Box 27, Skowhegan
Maryland	May 7-9	Baltimore	C. L. Inman, Jr.	Medical Arts Bldg., Baltimore
Massachusetts	May 6-9	Boston	H. E. Tingley	12 Bay State Rd., Boston
Michigan	Apr. 16-19	Detroit	F. Wertheimer	Michigan Dept. of Health, Lansing
Minnesota	Apr. 23-25	St. Paul	C. V. E. Cassel	Hamm Bldg., St. Paul
Mississippi	June 10-13	Biloxi	B. A. Cohen	Plaza Bldg., Jackson
Missouri	May 6-9	Jefferson City	E. D. Suggett	Merchants Bank Bldg., Jefferson City
Montana	May 3-6	Helena	E. G. Vedova	Box 311, Roundup
Nebraska	Apr. 30-May 3	Omaha	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	May 7-9	Las Vegas	O. M. Seifert	506 Humboldt St., Reno
New Hampshire	June 24-27	Rye Beach	F. E. Williams	814 Elm St., Manchester
New Jersey	Apr. 23-25	Atlantic City	J. G. Carr	407 Cooper St., Camden
New Mexico	May 20-24	Santa Fe	J. S. Eilar	Medical Arts Square, N.E., Albuquerque
New York	May 14-16	Syracuse	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 13-16	Pinehurst	R. D. Coffey	Box 270, Morganton
North Dakota	May 6-9	Minot	J. H. Pfister	419½ Dakota Ave., Wahpeton
Ohio			E. G. Jones	185 E. State St., Columbus
Oklahoma	Apr. 22-25	Oklahoma City	S. A. Russman	Medical Arts Bldg., Oklahoma City
Oregon	Mar. 5-7	Portland	T. D. Holder	Selling Bldg., Portland
Panama Canal Zone	Apr. 21		J. J. Dunne	5700 Dispensary, Albrook Air Force Base
Pennsylvania	Apr. 19-21	Harrisburg	M. D. Zimmerman	217 State St., Harrisburg
Puerto Rico			M. A. Rosso	409 Parque St., Santurce, San Juan

State	Date	Place	Secretary	Address
Rhode Island	Jan. 17, 18	Providence	W. D. MacIntosh	Industrial Bank Bldg., Providence
South Carolina	May 6-8	Spartanburg	J. R. Owings	7 Medical Court, Greenville
South Dakota	May 13-16	Huron	L. N. Thelen	229 S. Prairie St., Sioux Falls
Tennessee	Apr. 30-May 3	Memphis	A. M. Ballentine	Pulaski
Texas	Apr. 29-May 2	Fort Worth	W. Ogle	3707 Gaston Ave., Dallas
Utah	May 17-19	Salt Lake City	R. C. Dalgleish	State Capitol Bldg., Salt Lake City
Vermont	May 20-22	Manchester	E. H. Van Santvoord	128 Merchants Row, Rutland
Virginia	May 9-12	Roanoke	W. T. McAfee	Colonial National Bank Bldg., Roanoke
Washington	Mar. 22-24	Seattle	W. B. Martin	Medical-Dental Bldg., Seattle
West Virginia	July 22-25	White Sulphur Springs	G. N. Casto, Jr.	710½ Lee St., Charleston
Wisconsin	Apr. 9-11	Milwaukee	A. E. Kopp	Wells Bldg., Milwaukee
Wyoming	June 14-16	Cody	T. J. Drew	State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
Alabama	June 24-29*‡ June 25, 26†‡		W. L. McCarty	Professional Center, Montgomery
Alaska			R. H. Williams	Box 2122, Juneau
Arizona			W. G. Biddulph	1502 W. Osborn Rd., Phoenix
Arkansas	June 18-22	Little Rock	W. T. Jones	107 E. Shelton, Monticello
California	June 18 July 23	Los Angeles San Francisco	T. E. Tilden	Medico-Dental Bldg., Sacramento
Colorado	June 25-29	Denver	J. M. Peabody	Republic Bldg., Denver
Connecticut			C. G. Brooks	302 State St., New London
Delaware			P. K. Musselman	143 W. Main St., Newark
District of Columbia			W. T. Birthright	1835 Eye St., N.W., Washington
Florida	July 9-19*†	Jacksonville	A. W. Kellner	P. O. Box 155, Hollywood
Georgia			P. M. McNeil	First National Bank Bldg., Rome
Hawaii			H. L. Houvener	Dillingham Bldg., Honolulu
Idaho			A. G. DeWinter	Sun Bldg., Boise
Illinois	June 26-29‡ Nov. 27-30‡		W. A. McKee	Wood Bldg., Benton
Indiana	June 12-15*†	Indianapolis	C. A. Frech	Gary National Bank Bldg., Gary
Iowa	May 28-June 1*†	Iowa City	P. A. Hahn	Farmers & Merchants Bank Bldg., Burlington
Kansas	June 11-14‡		G. L. Teall	Box 71, Hiawatha
Kentucky	June 4-7*†	Louisville	J. J. Kelly	102 W. Madison St., Franklin
Louisiana	June 3-8	New Orleans	R. C. Steib	Maison Blanche Bldg., New Orleans
Maine			R. A. Derbyshire	Box 387, Skowhegan
Maryland	June 11-13‡		H. Levin	3429 Park Heights Ave., Baltimore
Massachusetts			T. J. Glennon	323 Main St., Woburn
Michigan	June 10-16	Ann Arbor	J. L. Champagne	3714 W. McNichols Rd., Detroit
Minnesota	June 11-15‡		M. G. Walls	615 Montcalm Place, St. Paul
Mississippi	June 19-21‡		J. C. Boswell	Lamar Life Bldg., Jackson
Missouri			R. R. Rhoades	Central Trust Bldg. Jefferson City
Montana			R. O. Betzner	303 Power Block, Helena
Nebraska	June 11-16	Lincoln	H. E. Weber	Federal Securities Bldg., Lincoln
Nevada	June 25	Reno	R. Whitehead	Masonic Temple, Reno
New Hampshire	June 21, 22* June 21†	Boston	S. G. Markos	8 Renaud Ave., Dover
New Jersey			W. A. Wilson	150 E. State St., Trenton
New Mexico	June 18-23	Santa Fe	J. J. Clarke, Sr.	Artesia
New York	Feb. 2, 3, 7-10*‡ Feb. 2, 7, 8†‡ June 21, 22, 26-29*‡ June 21, 22, 26, 27†‡ Oct. 10, 11, 16-19*‡ Oct. 10, 16, 17†‡		D. W. Be[illegible]	23 S. Pearl St. Albany 7

State	Date	Place	Secretary	Address
North Carolina	June 25‡	Chapel Hill	J. H. Guion	Doctors Bldg., Charlotte 7
North Dakota	July 9-13	Fargo	T. M. Flath	Williston
Ohio			H. B. Smith	322 E. State St., Columbus
Oklahoma			W. E. Cole	First National Bank Bldg., Oklahoma City
Oregon	June 4-7*†	Portland	F. L. Utter	Pioneer Trust Bldg., Salem
Pennsylvania	June 18-23*†	Philadelphia Pittsburgh	A. M. Stinson	Dept. of Public Instruction, Box 911, Harrisburg
Puerto Rico			J. Mercado C.	Box 3717, Santurce
Rhode Island			F. M. Hackett	267 Academy Ave., Providence
South Carolina			J. L. Gunter	1226 Pickens St., Columbia
South Dakota			H. T. Aker	Canton
Tennessee	June 11-15‡		C. R. Aita	Bennie Dillon Bldg., Nashville
Texas			R. T. Weber	Capital National Bank Bldg., Austin
Utah			G. W. Vogel	Eccles Bldg., Ogden
Vermont			P. M. Fitch	Newport
Virginia			J. M. Hughes	Medical Arts Bldg., Richmond
Washington			M. L. Mower	National Bank of Commerce Bldg., Olympia
West Virginia	June 25-27*†	West Liberty	J. B. Davis	Goff Bldg., Clarksburg
Wisconsin	June 4-8*†	Milwaukee	S. F. Donovan	Tomah
Wyoming			W. A. Hocker	O & S Bldg., Casper

Most states require applications to be in 30 days prior to examination date.
*Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board or information on locations of examinations. §Approximate dates—verify with state dental examining board.

MEETINGS OF OTHER ORGANIZATIONS

Name	Date	Place	Secy. or Chm.	Address
Academy of Denture Prosthetics	Apr. 29-May 6	Colorado Springs	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
Academy of General Dentistry	Feb. 7	Chicago	A. Knab	8500 S. Stony Island Ave., Chicago
American Academy of Crown and Bridge Prosthodontics	Feb. 4, 5	Chicago	E. C. Brooks Secy.	4500 Olive St., St. Louis
American Academy of Dental Medicine	June 21-24	Detroit	G. J. Witkin Secy.	45 S. Broadway, Yonkers, N.Y.
American Academy of Implant Dentures	Feb. 4	Chicago	P. S. Loechler Secy.	540 N. California, Stockton, Calif.
American Academy of Maxillofacial Prosthetics	Feb. 1-4	Chicago	A. H. Bulbulian Gen. Chm.	Mayo Clinic, Rochester, Minn.
American Academy of Pedodontics	June 11-15	Milwaukee	E. C. Schildwachter Secy.	6831 Seville Ave., Huntington Park, Calif.
American Association of Dental Schools	Mar. 25-28	St. Louis	M. W. McCrea Secy.	Baltimore College of Dental Surgery, Dental School, University of Maryland, Baltimore 1
American Association of Endodontists	Feb. 4, 5	Chicago	V. B. Milas Secy.	2559 W. 63rd St., Chicago
American Association of Industrial Dentists	Apr. 24-26	Philadelphia	E. R. Aston Secy.	South Office Bldg., Harrisburg, Pa.
American Association of Orthodontists	Apr. 29-May 3	Boston	F. A. Squires Secy.	Medical Centre, White Plains, N.Y.
American Board of Oral Surgery	Apr. 7-10	Chicago	L. M. FitzGerald Secy.	Roshek Bldg., Dubuque, Iowa
American Board of Pedodontics	Feb. 2-4	Ann Arbor, Mich.	R. L. Ireland Secy.	College of Dentistry, University of Nebraska, Lincoln, Neb.
American Denture Society	Feb. 3, 4	Chicago	V. L. Steffel Secy.	College of Dentistry, Ohio State University, Columbus, Ohio
British Dental Association	June 25-29	Brighton, Sussex, England	H. P. Buchanan Secy.	13 Hill St., Berkeley Sq., London, England
Canadian Dental Association	June 3-6	Banff, Canada	R. L. Rasmussen	Greyhound Bldg., Calgary, Alberta, Canada
Chicago Dental Society	Feb. 5-8	Chicago	K. S. Richardson Exec. Secy.	30 N. Michigan Ave., Chicago

Name	Date	Place	Secy. or Chm.	Address
Council on Dental Education, Dental Aptitude Tests	Apr. 27, 28		S. Peterson Secy.	222 E. Superior St., Chicago
Federation Dentaire Internationale	May 28-June 3	Zurich, Switzerland	G. H. Leatherman Secy. Gen.	35 Devonshire Place, London, England
Fourteenth Australian Dental Congress	Mar. 5-9	Melbourne, Australia	H. R. Cash Pres.	49 Mathoura Rd., Toorak, Australia
Greater Philadelphia Annual Meeting	Feb. 1-3	Philadelphia	J. H. Eshleman Secy.	Bellevue-Stratford Hotel, Broad and Walnut Sts., Philadelphia
International Association for Dental Research	Mar. 22-25	St. Louis	D. Y. Burrill Asst. Secy.	129 E. Broadway, Louisville 2, Ky.
National Board of Dental Examiners	Apr. 2, 3		G. J. Casey Secy.	222 E. Superior St., Chicago
Northeastern Dental Society	June 3-6	Swampscott, Mass.	M. J. Frasca Secy.	153 Cabot St., Beverly, Mass.
Northwest Conference in Dental Medicine, Twelfth Annual Conference	May 13-17	Victoria, B.C., Canada	G. Underwood Secy.	Selling Bldg., Portland, Ore.
Seventh Annual Berkshire Conference	June 17-21	Lenox, Mass.	I. Glickman Dir.	Tufts University, School of Dental Medicine, 136 Harrison Ave., Boston
Thomas P. Hinman Mid-Winter Clinic	Mar. 18-21	Atlanta, Ga.	D. H. Simpson Gen. Chm.	Medical Arts Bldg., Atlanta, Ga.

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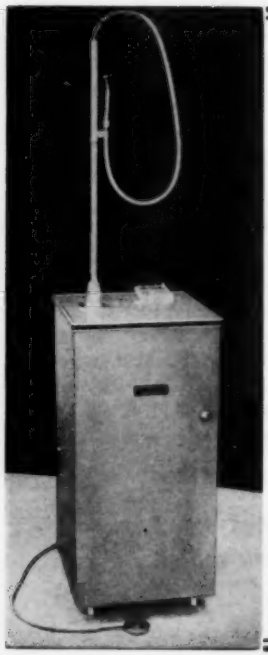

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*JADA Vol. 47, P. 324-329, Sept. 1953. NELSEN, R. J., D.D.S.; PELANDER, C. E.; KUMPULA, J. W.: Hydraulic Turbine Contra Angle Handpiece. (Reprint on request)

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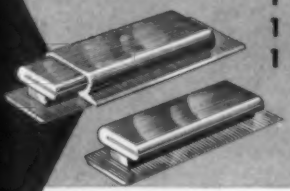

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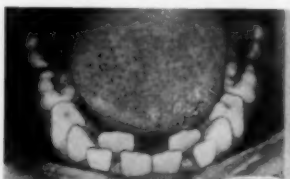

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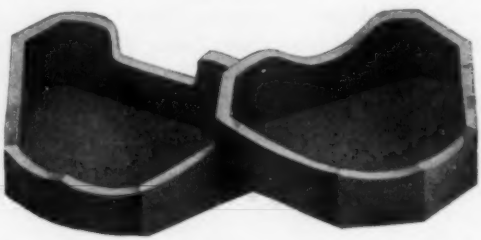

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April 2-3, 1956

(Applications should be received by March 1, 1956)

December 3-4, 1956

(Applications should be received by Nov. 7, 1956)

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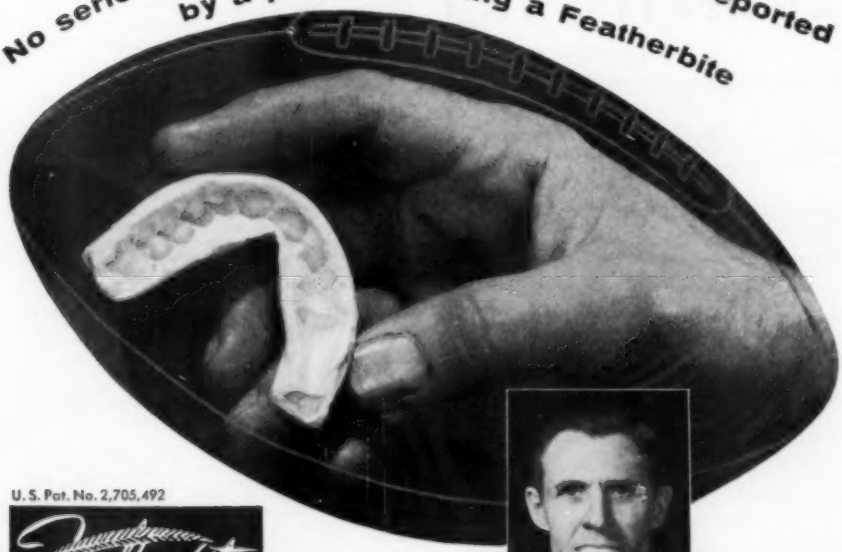

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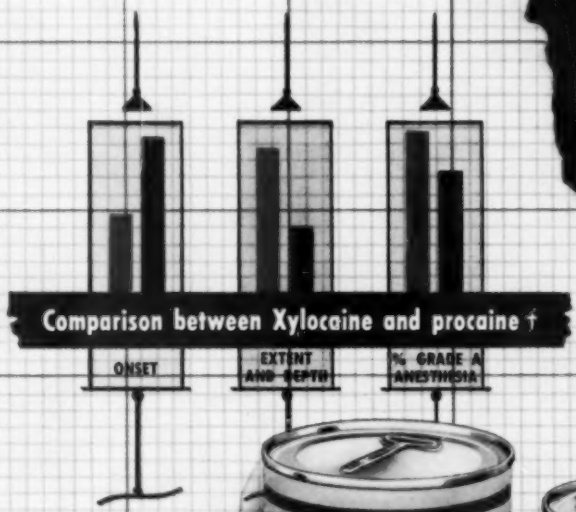

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(Huldt, S., "Factors Influencing the Efficiency of Dental Local Anesthetics in Man", Acta Odontologica Scandinavica, Volume 11, Supplement 13, 1953.

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Gurdjian, E. S., and Webster, J. E., Amer. J. of Surgery, 63:236, 1944.

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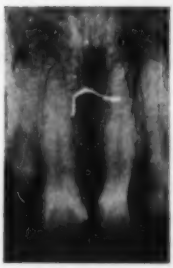

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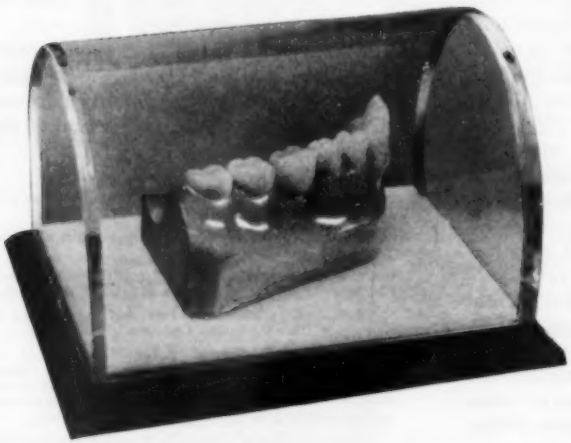

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1. Sebrell, W. H., Jr.: Trends and Needs in Nutrition, J.A.M.A. *152*:42 (May 2) 1953.
2. King, C. G.: Newer Concepts of Optimum Nutrition, Food Technol. *8*:486 (Nov.) 1954.
3. Kelly, H. T.: Impact of Modern Nutrition on Twentieth Century Morbidity, Pennsylvania M.J. *58*:481 (May) 1955.
4. Sherman, H. C.: Chemistry of Food and Nutrition, ed. 8, New York, The Macmillan Company, 1952, p. 212.
5. Joint Report of the Council on Dental Health and the Council on Dental Therapeutics of the American Dental Association: Sugar and Dental Caries: The Effect on the Teeth of Sweetened Beverages and Other Sugar-Containing Substances, J. Am. Dent. A. *47*:387 (Oct.) 1953.
6. "The Care of Children's Teeth," in Questions and Answers, 1954, American Dental Association, p. 14.

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*National Research Council's recommended daily dietary allowances (1953): Children (ages, 4 to 6 years); weight, 40 lbs.; height, 43 inches. Boys (ages, 13 to 15 years); weight, 108 lbs.; height, 64 inches. Men (age, 25 years); weight, 143 lbs.; height, 67 inches. Women (age, 25 years); weight, 121 lbs.; height, 62 inches.

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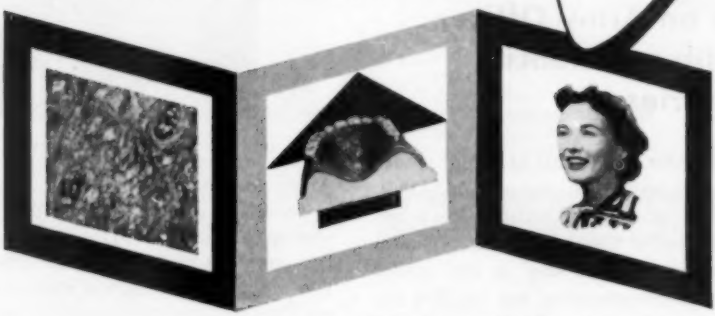

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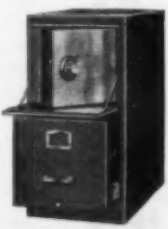

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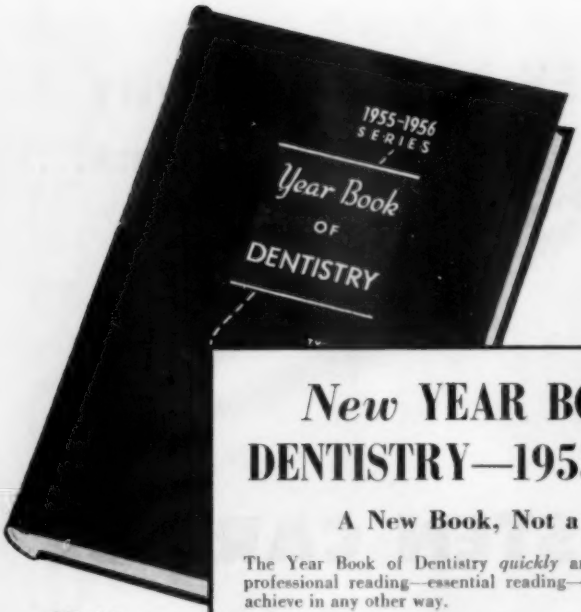

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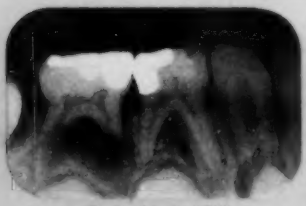
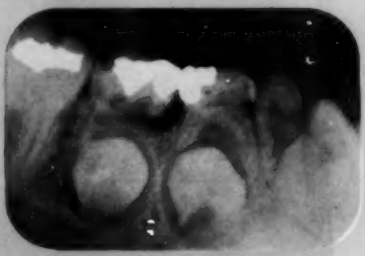


September 6, 1951

Dental radiographs, child patient: April 26, 1951 to April 26, 1955.

November 6, 1951

April 16, 1952



November 13, 1952

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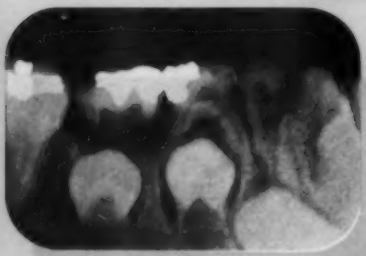
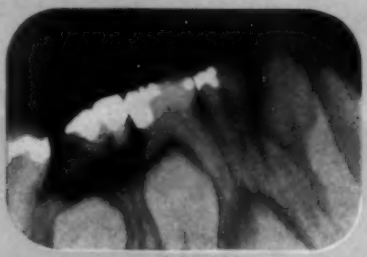


May 9, 1953

September 15, 1953



March 25, 1954

October 21, 1954

April 26, 1955

and treatment of a child's teeth...

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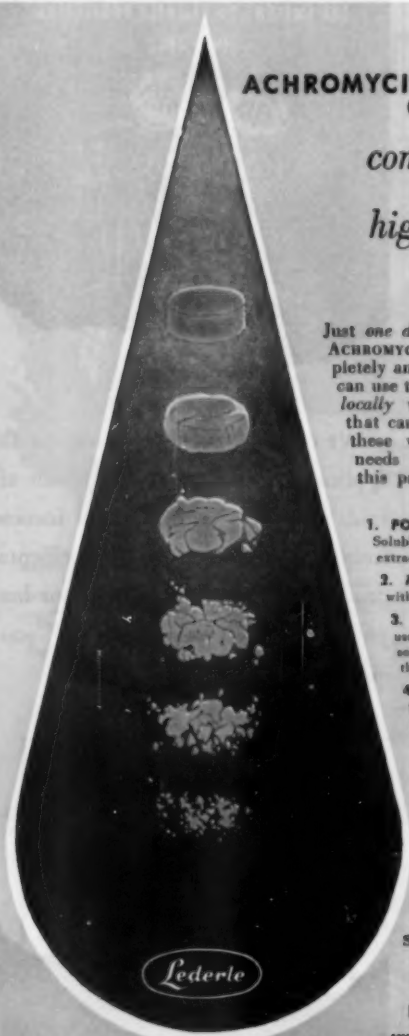

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completely soluble!

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Just *one drop* of water is sufficient to place an ACHROMYCIN Tetracycline Soluble Tablet completely and quickly in solution. That means you can use this renowned broad-spectrum antibiotic *locally* without fear of undissolved particles that can cause foreign-body reactions. In fact, these versatile tablets fill *several* important needs in your daily practice! Just look at this partial list:

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ACHROMYCIN Soluble Tablets 50 mg. are available from your usual source of supply in bottles of 40 and 100. They do not require refrigeration. Order a supply today!

FREE For your convenience in prescribing ACHROMYCIN, Lederle has prepared special prescription pads. Write for yours!

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AMERICAN *Cyanamid* COMPANY Pearl River, New York

ACHROMYCIN*

AN AID TO, NOT A SUBSTITUTE FOR, GOOD DENTISTRY

for caries-active patients *prescribe*

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Sugarless Gum

Sold through drug, department and health food stores. Samples and literature on request. Please give druggist's name, address.

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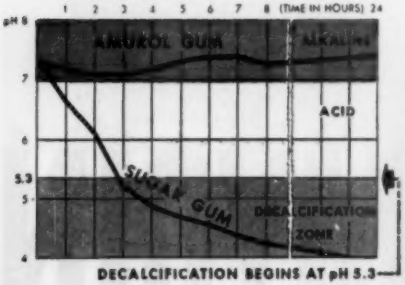
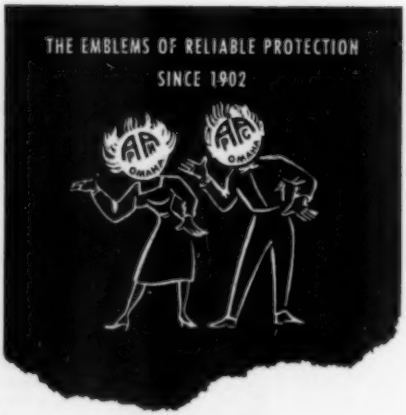
Comparative *in vitro* Effects of Sugar Gum and Amurol Gum added to Saliva



DECALCIFICATION BEGINS AT pH 5.3

As shown above, pH of caries-active saliva *in vitro* remains in alkaline zone for hours with AMUROL SUGARLESS GUM, whereas with sugar gum the pH drops to the acid level under the same conditions.



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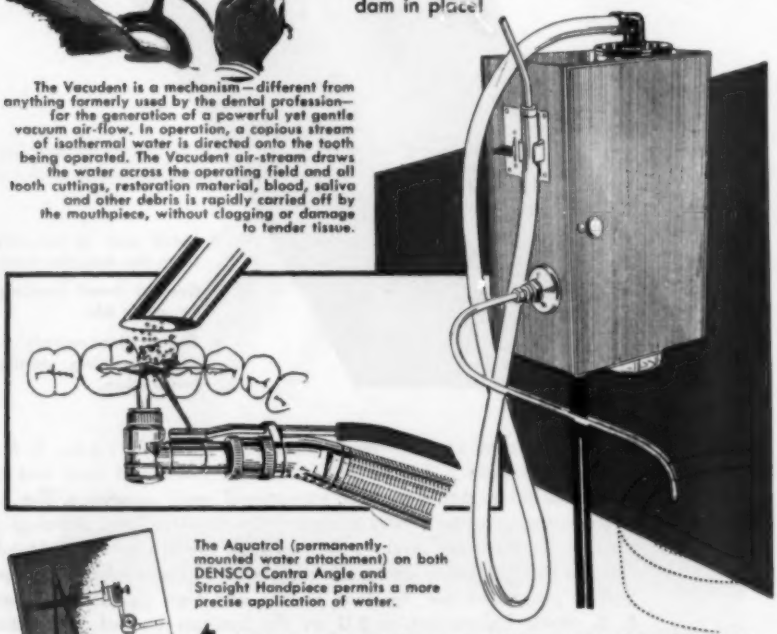
The Hydro-flo Technique with Vacudent ensures Better Dentistry through a clean, clearly-visible operating field at all times. The many benefits of "washed-field" dentistry can even be enjoyed with the rubber dam in place!

The Vacudent is a mechanism—different from anything formerly used by the dental profession—for the generation of a powerful yet gentle vacuum air-flow. In operation, a copious stream of isothermal water is directed onto the tooth being operated. The Vacudent air-stream draws the water across the operating field and all tooth cuttings, restoration material, blood, saliva and other debris is rapidly carried off by the mouthpiece, without clogging or damage to tender tissue.



The Aquatrol (permanently-mounted water attachment) on both DENSCO Contra Angle and Straight Handpiece permits a more precise application of water.

Ask your salesman for a copy of "Better Dentistry...Faster"

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- **Latch seat is actually harder than the bur, for long wear.**
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For smooth, cool, chatter-free operating up to 16,000 r.p.m., S. S. White's new Contra-Angle S U is definitely superior. Hardened steel and phosphobronze bearings throughout for exceptional wear resistance. The bur tube, for instance, actually rotates in super hard steel for long, stand-up performance under the most severe strains of high speed operating. Stainless and rust-resistant, this newly designed angle keeps its clean, gleaming appearance despite prolonged use. For long service and high operating efficiency, put S. S. White Contra-Angles S U on the business end of your handpieces. Order from your dental salesman.

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FOR HIGH SPEED OPERATING

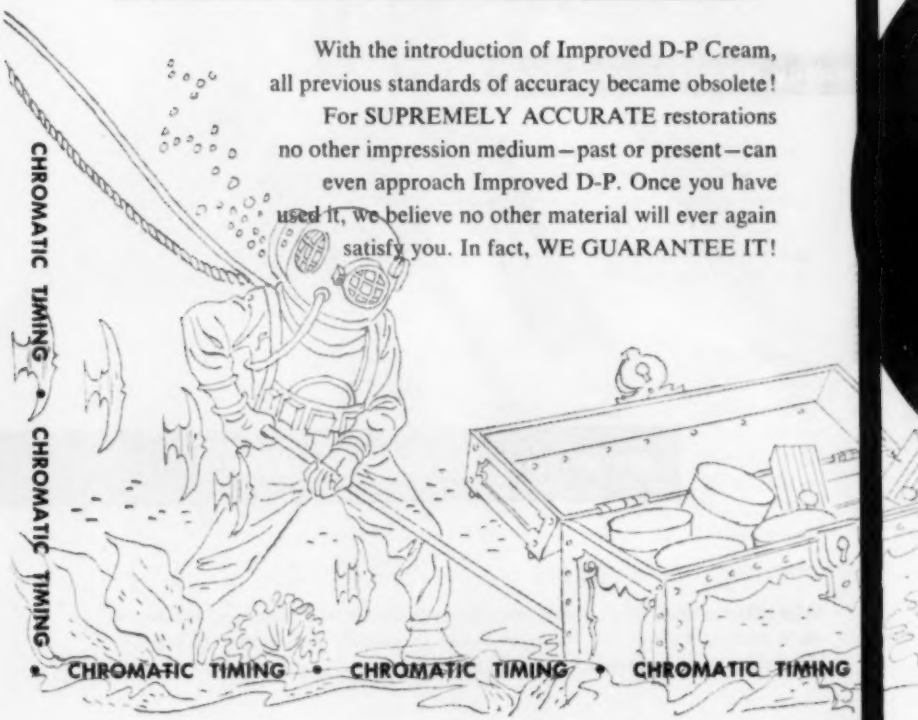
S. S. WHITE CONTRA-ANGLE S U

Sterilizable by any method Gears and bearings are made up in assemblies that can be taken apart completely in a matter of seconds for daily cleaning, sterilizing, and lubrication.

Now! Improved D-P Cream

offers you ease of use and accuracy never before attained!

With the introduction of Improved D-P Cream, all previous standards of accuracy became obsolete! For SUPREMELY ACCURATE restorations no other impression medium—past or present—can even approach Improved D-P. Once you have used it, we believe no other material will ever again satisfy you. In fact, WE GUARANTEE IT!



greatest elasticity without distortion...

The secret of Improved D-P Cream is the unequalled degree to which this material combines firm body with lively elasticity. Firm body eliminates fear of distortion, even in the critical peripheral areas. Lively elasticity eliminates the possibility of broken teeth!

plus these other important advantages...

- Quick mixing to a smooth, creamy consistency.
- Heavy, non-running body.
- Ideal setting time.
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- Accuracy maintained over a long period without need for fixing solutions.
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Quality Service since 1915

ANOTHER MEASURE OF DRESCH DEPENDABILITY

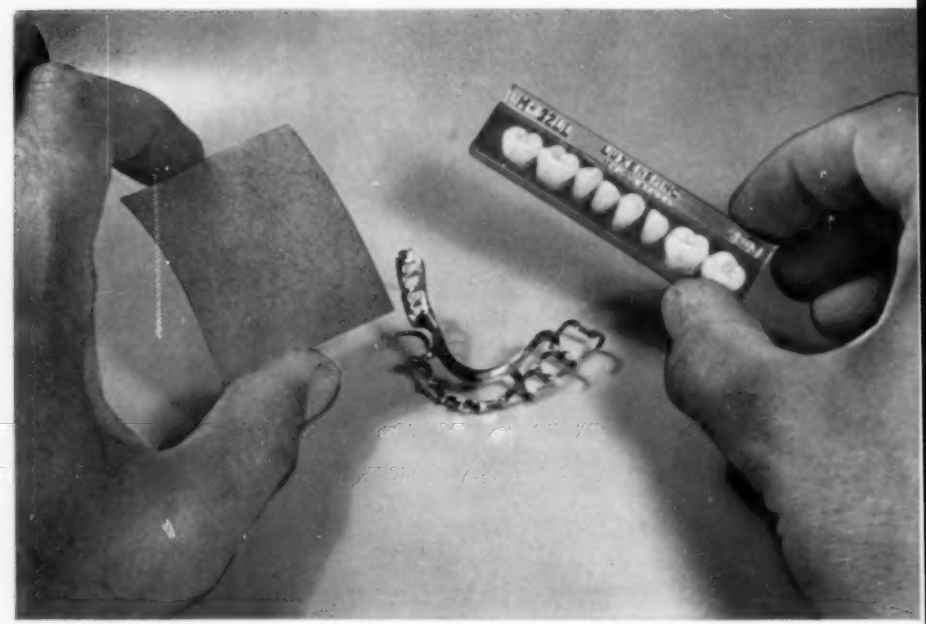
Some hae meat and canna eat
And some wad eat that want it
But we hae teeth and we can eat
And so the Lord we thankit.

Lots of people appreciate the wonderful contribution to their welfare and happiness which modern dentistry has made possible. The dentist and the chemist have worked together to produce the perfection illustrated in the following pages. Some Oral Pathologists say these dentures are as natural as Nature itself. The story of why the All Luxene Denture excels is well worth reading.

IT TAKES ALL FOUR,

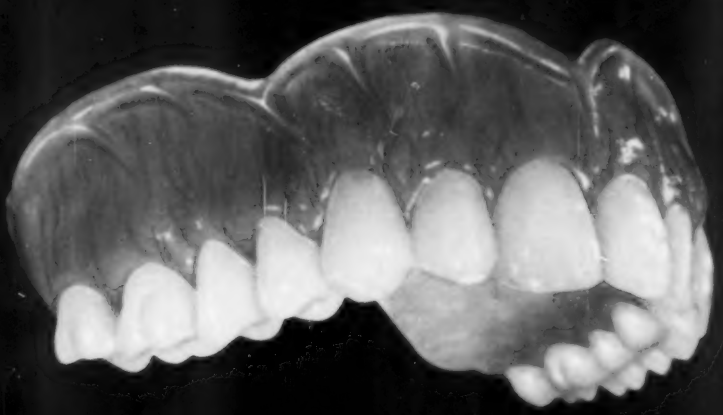
PLUS ONE THING MORE . . .

TO MAKE YOUR PARTIAL DENTURES SCORE!



Providing the impression is accurate and the stone model properly mixed and poured, you can be completely assured that

1. The metal skeleton will fit the original model.
2. Luxene attachments will not break away.
3. Luxene teeth are cured to the base and they do not crack or craze.
4. Clinical records reveal unusually high resistance to abrasion and complete compatibility with natural teeth.
5. *Plus one thing more . . .* Skilled hands — with natural ability, experience and a desire to serve.



THE ALL LUXENE 44 C-TONE DENTURE

Oral pathologists from several prominent universities say after examining many different samples that the C-Tone effect produced by fibres incorporated in Luxene 44 — reproduces natural gum tissue and matches nature with great fidelity.

These same authorities have commented on Luxene teeth. They say the ability to absorb light like natural teeth provides a great step forward in the attempt to match the appearance of natural teeth under all light conditions.

The chemical combination of Luxene 44 and Luxene teeth results in a practical denture that provides a sanitary feature not possible when porcelain teeth are used.

PUBLISHED ON BEHALF OF LUXENE SELECTED LABORATORIES

EACH LUXENE

LABORATORY ACCOMPLISHES

THE DOCTOR'S GOAL BY

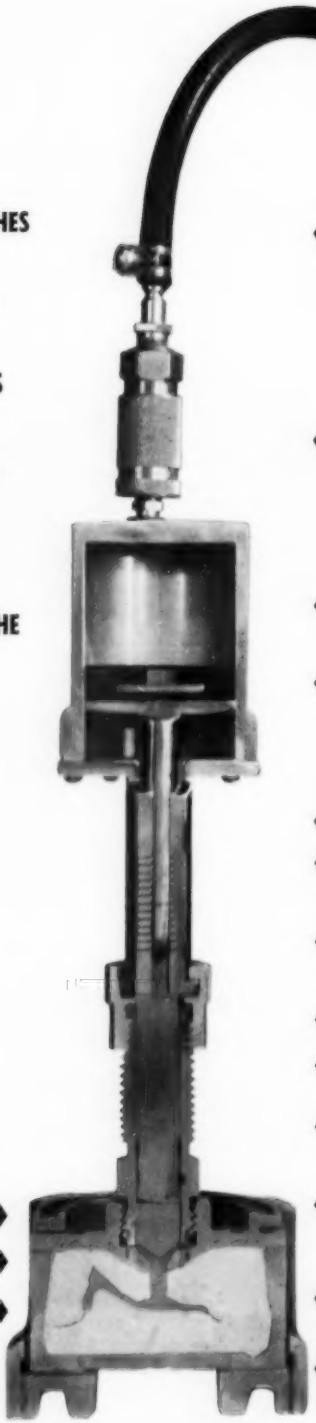
THE USE OF THE FAMOUS

PRESSURE CAST PROCESS.

THIS CASTING PROCESS

VIRTUALLY ELIMINATES THE

RAISED BITE ERROR.



Hose to compressed air supply.

Air gun coupler permits an easy connection to air supply.

Air gun cylinder.

Air gun cup.

Air gun piston.

Air gun guide indicates amount injecte

Hole in piston enables operator to remov the piston by slipping metal rod throug the hole and pulling it up. This is nece sary for recharging.

Air gun adapter.

Piston.

Nozzle threaded to screw into air gu adapter.

Lid and bottom surface perfectly flat so as to close uniformly.

Sprue button.

Side of cage.

Flask splits here. Notice how perfectly closed — metal to metal contact.

In the center of the flask is a cross-sectio of the moulded denture having no fi

Bottom ring of the "cage" which, whe tightened in cage closer, closes the flas perfectly.

Printed in U.S.
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Patients accept dental care more readily when the fear of pain is allayed. By making BUFFERIN a part of your pre- and post-treatment routine you can minimize the discomfort of dental procedures, and thus gain the cooperation of your patients. The side effects, nausea, heartburn, which follow the use of straight aspirin by some patients, are markedly less when BUFFERIN is the analgesic used.

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Acts Twice as Fast as Aspirin
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TRUBYTE® *Biotone*® TEETH

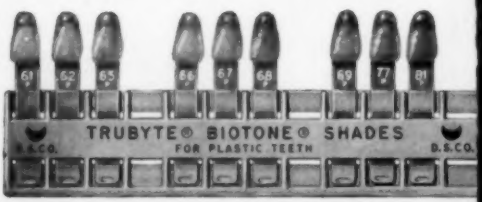
the new balanced formula plastic teeth with the high fidelity shades

Yes, there is something new in plastic tooth shades...it's the important element known as Constant Color Relation...built into Trubyte Biotone Teeth.

Trubyte Biotone Teeth are made from an entirely new plastic formula which provides important new optical and color qualities. This new formula, plus new shade blending methods, introduces a new naturalness of color, improved translucence, fluorescence and color absorption, and a greater natural vitality of appearance.

Trubyte Biotone shades are high fidelity, natural appearing plastic tooth shades. Unlike conventional plastic teeth, these new shades do not "gray out" in the mouth. This is important in your tooth selection because it saves your time. Constant Color Relation eliminates the resets and remakes so commonly observed with conventional plastic tooth shades, which invariably appear darker and grayer in color in the mouth than they do on the shade guide or on the card.

For natural esthetics in plastic teeth, specify Trubyte Biotone shades . . . use the new Trubyte Biotone Shade Guide to specify shades for Trubyte Biotone Anteriors, Trubyte Biotone Pilkington-Turner Posteriors.



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